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Technical report: The development of Malawi's furniture and joinery industry in the PTA context*

Prepared for the Preferential Trade Area for Eastern and Southern African States (PTA)
by the United Nations Industrial Development Organization,
associated agency of the Food and Agriculture Organization
of the United Nations, which acted as executing agency for the
United Nations Development Programme

Based on the work of Pietro Borretti,
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* This document has not been edited.

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ABSTRACT

Pietro Borretti, The Development of Malawi's Furniture and Joinery Industry in the PTA context FAO/PTA/UNIDO, June 1990.

The report reviews the status of Malawi's secondary woodprocessing industry with respect to market conditions, level of technology, product development and supply and utilization of plantation-based materials, in cross-reference with the situation in the PTA sub-region. It outlines opportunities for exchange of experience within the PTA and provides terms of reference of proposed technical assistance activities to be undertaken at sub-regional level aimed at increasing the operative efficiency of the sector. Annexed is a check list of woodworking factories in other PTA countries whose operation and/or products could be of interest to Malawian manufacturers.

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- Mr. Matsuka, Senior Industrial Development Officer, Ministry of Industry .
- Mr. Kachiza, Industrial Development Offer, Ministry of Industry,
- Mr. Mkaonja, Chief Forest Officer, Forestry Dept.

INTRODUCTION

1	Title of mission:	Survey of Malawi's secondary wood-processing industry in the PTA context
2	Mission carried out by:	Pietro Borretti, Consultant in the secondary wood industry
3	Period of mission: Itinerary	8 to 15 December 1989 Lilongwe-Blantyre-Limbe-Blantyre-Lilongwe
4	Title and number of project:	Intra-regional Cooperation in Development of Plantation-based Forest Industries - RAF/87/117 (UNDP-funded Regional Project) P.O.BOX 30563, Lusaka, Zambia
5	Executing Agency:	Food and Agriculture Organization of the United Nations (FAO)
6	Cooperating Agency:	United Nations Industrial Development Organization (UNIDO)
7	Sub-regional Institutional relationship	Secretariat of the Preferential Trade Area for Eastern and Southern African States (PTA) P.O.BOX 30051, Lusaka, Zambia
8	Objectives of the	(a) To undertake a survey of existing furniture manufacturing enterprises (b) To cater information on supply and demand of furniture (c) To recommend how rationalization and future investment in the sector can be implemented (d) To evaluate priorities for rehabilitation, modernization and expansion.
9	Main institutional contacts:	(a) Mr R.A.P. Matsuka Senior Industrial Development Officer Ministry of Trade, Industry and Tourism (b) Mr C.C. Kachiza Industrial Development Officer Ministry of Trade, Industry and Tourism

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1 In spite of Malawi's average annual growth of 8.6 per cent in urban population in the period 1980-87, the market for furniture produced in the formal manufacturing sector has not shown a corresponding trend since 1985 because of the stagnation in the construction of new urban dwellings. Thus the challenge ahead for the secondary wood processing industry and building construction sector consists in the capability of increasing operative cost efficiency and produce low-cost wood products and low-cost residential building units, in order to cope with the expected formation of115,000 new urban household units in the period 1987 - 2000.

2 In Malawi the government has traditionally taken a direct and prominent role in the development of the woodworking industry geared to the utilization of fast-growing timber species from state softwood plantations. This involvement has culminated in the establishment of two major woodworking enterprises: the furniture plant of the WICO corporation and the VIPLY primary woodworking complex - a joint public/private enterprise. In the private sector the dominant secondary wood-processing operation is the International Timber Ltd that has pioneered the production of gluelam products in eucalyptus in integration with a sawmill and a plymill.

3 The WICO furniture plant is not only the most modern enterprise of its kind but also one of the very few plants in the PTA purposely established for the utilization of exotic softwood plantation species. It is also one of the only two furniture plants in the sub-region which exports pinewood furniture components overseas. The WICO operation has yet to attain a high degree of operative efficiency. However, in view of its initial achievements and its potential, it is recommended that this particular plant be selected to host an "eye opener" seminar for the benefit of both its supervisory personnel and those from other furniture plants in the PTA. The seminar will cover all critical subjects of plant operation with the aim of optimizing the benefits of industrialized wood-processing (see Objective no. 1 in Recommended Follow-up Chart on page 33).

4 Most of the private furniture plants visited during the mission are contributing little to the development of the sector because their operation is still based on time-consuming and material-wasting artisanal methods, even where a good range of equipment is present.

5 Thus the potential for the development of the furniture industry in Malawi depends largely on the strengthening of the WICO plant and on promoting the establishment of small-scale furniture enterprises especially in smaller urban centres, as advocated in the current Development Plan 1987-1996.

As the development of small-scale enterprises is a development priority shared by most PTA member states, it is

recommended that a sub-regional seminar be conducted with the aim of generating appropriate know-how on the establishment of new small-scale plants and the improvement of existing ones (See Objective no.4 in Recommended Follow-up Chart on page 35). The seminar would also deal with the development of co-operative services for the small-scale woodworking enterprises.

6 One of the main drawbacks in the development of the woodworking sector as a whole is the lack of skilled labour and managerial staff trained according to the actual needs of the industry. In this respect it is recommended that training/reference manuals be prepared on the most critical aspects of plant design and operation. The manuals will be utilized by formal training institutions in the PTA sub-region and at the same time serve as a reference in the day-to-day operation of furniture and joinery plants (See Objective no.2 in Recommended Follow-up Chart on page 33).

7 One of the main causes of high operating costs and poor quality of finished wood products is the lack of proper tool maintenance equipment and know how in most secondary wood-processing plants. In this context, it is recommended that short-term tool maintenance training courses of sub-regional scope be conducted by the FAO/PTA/UNIDO project (See Objective no.3 in Recommended Follow-up Chart on page 34).

8 Malawi is the PTA member state with the third largest plantation area (91,500 ha) - a resource which is expected to provide enough stock to the woodworking industry for the foreseeable future. Plantation timber consists mainly of Pinus species (68,100 ha) and Eucalyptus species. These timbers are together with Cypress among the main species present in all planted forests throughout the PTA. In order to expand the capability of utilizing these species efficiently, both in the furniture/joinery industry and in building construction, it is proposed that reference papers be prepared with respect to correct wood processing and wood treatment techniques as applicable to selected plantation timber species (See Objective no.5 in Recommended Follow-up Chart on page 36).

9 Malawi's growing potential for exporting primary wood products within the PTA sub-region has been boosted considerably since the establishment of the VIPLY woodworking complex which has attained an initial annual export of 5,000 m3 of sawnwood to Botswana and minor quantities of wood-based panels to Zambia and Tanzania.

10 Equally promising is the export of secondary wood products outside the PTA area with the WICO's new furniture plant now exporting regularly overseas simple, do-it-yourself furniture components, and the International Timber Ltd exporting gluelam building components to South Africa - a market which could offer a significant export potential once apartheid is dismantled.

Proposed technical assistance of sub-regional scope to be undertaken by the FAO/PTA/UNIDO project to promote the development of the secondary wood processing industry in the PTA member states is summarized as follows:

(a) Conducting "Eye opener" seminars dealing with the main critical aspects of plant design and operation;

(b) Conducting specialized seminars and short-term courses dealing in detail with particular subjects;

(c) Preparing reference papers on applied research work concerning the utilization of plantation timber; and

(d) Preparing training manuals for use by training institutions and as a reference for plant managers.

CHAPTER II - FINDINGS

1 Demand and supply

1.1 Present status

Malawi's urban population, which represents the main market for furniture and joinery produced in the formal manufacturing sector, amounted to just over 1 million in 1987, or 13 per cent of the total population of 7.9 million, as estimated in the 1989 World Development Report of the World Bank. According to the report, the urban population grew at an average annual rate of 8.6 per cent in the period 1980-87 as compared to a 7.5 per cent growth in 1965-80.

The concentration of urban population occurs in Blantyre (300,000), Lilongwe (160,000), Zomba (30,000) and Mzuzu (17,000) the only major centre in the Northern Region.

The market for furniture and joinery has been seriously affected due to the stagnation in the development of the urban housing sector, exacerbated by high rising costs for the private individual, and a particular problem of subsidization in the public sector. In fact, during the past decade the demand for new urban housing units has not only continued to grow but the rate of supply has fallen off very sharply, giving rise to substantial squatter settlements in all major urban centres.

The down-turn in building construction activities reflects the uncertain general state of the economy whose revival has lost momentum since 1985, sapped by deteriorating terms of trade, the huge diversion of resources into alternative external transport routes and continuing high debt-service obligations. Thus the challenge ahead for both the furniture and joinery industries and the building construction sector consists in developing the capability of producing low-cost wood products and low cost residential building units.

1.2 Future development

The total population is expected to grow by over 50 per cent from 7.9 to 12 million in the period 1987 - 2000 (source: World Bank). Assuming a continuation of the 13 per cent urban-to-total population ratio, the country's urban population can be projected to grow from 1.03 million in 1987 to 1.56 million by the year 2000, corresponding to about 209,591 and 325,000 household units respectively. this means an extimated formation of about 115,400 new households (each consisting of an average 4.8 - 4.9 family members) in urban areas in the period 1987 - 2000.

So far as institutional furniture is concerned, the bulk of demand is expected to consist mainly of school furniture based on the projected need in the period 1987-1996 for an average of 1,420 new primary school classrooms (each for 50 students) a year country-wide, 60 per cent for new capacity and 40 per cent to replace existing dilapidated structures. Normally, new classrooms and new school furniture

will be accompanied by some teacher housing and furniture - an estimated total of 10,000 units over the decade.

1.3 External trade in wood products

Exports of wood products have been limited until 1988 to Eucalyptus gluelam components produced by the International Timber Limited and directed mainly to South Africa and to a lesser extent to Zambia and Tanzania. However, exports of wood products have increased considerably with the coming into stream of the VIPLY woodworking complex whose exports from October 1988 to September 1989 have included 5,000 m3 of sawnwood to Botswana - as compared to a total of 40 m3 exported in 1983 - and 5,300 m3 of wood-based panels, of which 5,000 exported to South Africa - as compared to 25 m3 exported in 1983. Overseas exports of simple furniture parts began in 1988 with the establishment of the WICO furniture plant. Imports of wood products are limited to: sawnwood of hardwood species (1,163 recorded imports in 1983); sapele veneer and sapele-veneered blockboard from South Africa and Zimbabwe.

2 Review of production facilities

2.1 General status

In Malawi, the government has traditionally taken a direct and prominent role in the development of the wood

processing sector as a whole. This began when the state softwood plantations started yielding significant log volumes and the private sector failed to take up related wood-processing activities.

The public-sector activities in wood-processing had originally been carried out by the commercial arm of the Department of Forestry, the Forest Industries Division (FID) established in 1968, and consisted of four sawmills located respectively in Blantyre (established in 1953), Zomba (established in 1963), Dedza (established in 1969) and Mazamba (established in 1982 near the Viphia plantation area). All sawmills except Mazamba's are equipped with kiln-drying facilities. Wood preservation is available at the Blantyre, Dedza and Mazambu sawmills.

The department of Forestry first engaged in secondary wood-processing activities with the establishment in 1964 of a joinery/furniture plant in integration to the Blantyre sawmill for the production of a wide range of furniture, doors, boxes and cratings. The Dedza and Zomba sawmills followed with the manufacturing of similar products. All along the FID plants have been utilizing almost exclusively solid pine as their raw material input, in contrast with furniture/joinery enterprises in the private sector which deal mainly with tropical hardwood.

In 1984 the four government sawmills were merged into a statutory body, the Wood Industries Corporation Ltd (WICO). Subsequently the furniture operation of the WICO Blantyre Sawmill was rehabilitated and expanded to become the largest and most modern furniture plant in the country.

In the private sector the dominant secondary wood-processing plants have remained the International Timbers Ltd. (ITL), formerly the Imperial Timber Ltd., and the Shire Ltd., the former producing plywood sawnwood, blockboard, flush doors and gluelam products in Eucalyptus; and the latter engaging in the manufacture of flush doors, standard roof-trusses in pine, prefab cabins and standard kitchen cabinet units.

Most of the private furniture/joinery plants in the formal manufacturing sector are owned and managed by Asian residents, but in general they are contributing very little to the development of the sector on the basis of industrialized methods. The best equipped of the Asian and the more open to change and improvements is the Capital Furniture Company in Lilongwe. Of the emerging small scale furniture/joinery making enterprises in the formal sector owned and managed by Malawians, the newly-established Famba Furniture Company displays a particularly good potential for development.

2.2 The WICO Furniture Factory, Blantyre

The furniture plant of the Wood Industries Corporation Limited (WICO) began operation in 1988 as an entirely new plant in integration with the Blantyre Sawmill. The mill had already been engaged since 1964 in the production of furniture and joinery. But it was only with the establishment of the new production facilities that the WICO could became Malawi's most modern furniture manufacturing

plant based on serial production and on the exclusive utilization of Pinewood as the raw material input.

The complex has a total work-force of 541 employees of which 74 are directly engaged in furniture production. The sawnwood consumption of the furniture/joinery operation amounts to about 3,000 m3 a year out of the total 6,000 m3 of sawnwood produced annually by the sawmilling operation of the complex.

The bulk of items produced consists of household furniture covering dining, living and bedroom requirements and includes over 90 designs. Also produced, on a complementary basis is a range of office furniture including senior, junior and typist desks. In addition to standard designs, the plant handles made-to-order furniture as well.

The production is aimed both at the local and export markets, each taking a 70 and 30 per cent share of sales respectively. Locally, 80 per cent of furniture is sold to individual customers and the remaining is directed to fill the needs of government housing projects.

Since mid 1987, WICO has been exporting overseas standard shelving made of solid, kiln dried pinewood. Each shelving unit consists of a board, two wall brackets, two moulded supports, assembly screws and wooden plugs to hide screw heads. The shelving units are packed individually ready for assembly by customers of department stores overseas. An average of four containers with 4,700 shelving units each are shipped overseas monthly by WICO. Furniture produced by WICO is shown in figures 1, 2, and 3.

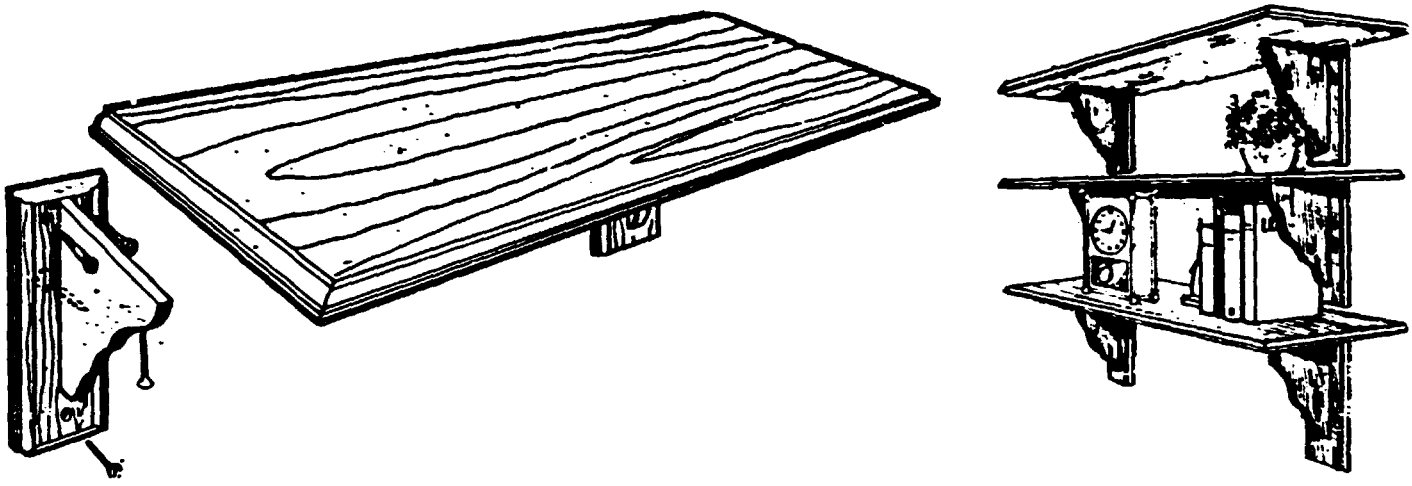

Figure 1 Standard shelving components produced and exported by WICO

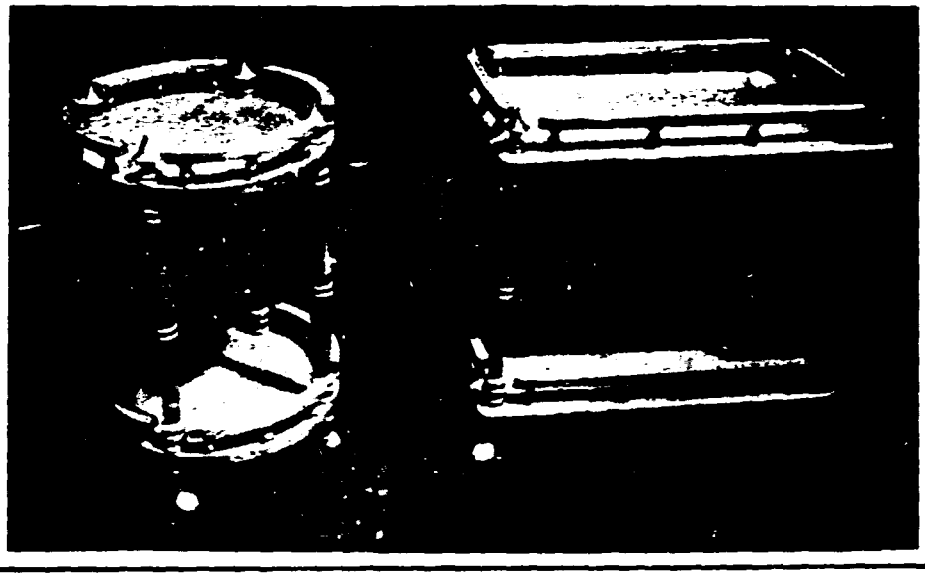

Figure 2

Standard trolleys produced by WICO

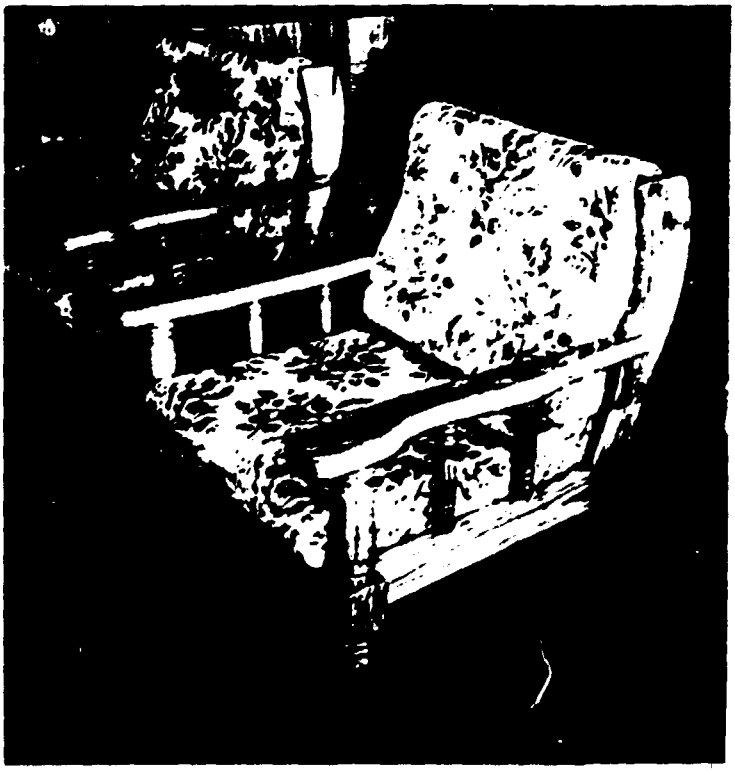

Figure 3

Standard easy chair produced by WICO

In addition to a complete set of basic woodworking machinery, the plant is equipped with the following equipment of intermediate type: two four-side moulders, a tenoning machine, a copying lathe, a multi-spindle boring machine, two clamp carriers and a spraying booth with water curtain. The plant is also provided with an advanced automatic press for the edge-gluing of narrow pinewood boards into wide, solid wood furniture panels. All sawnwood utilized in the plant is dried in a kiln of 80 m3 capacity.

At the time of the consultant's mission, a major operating problem was caused by glue-line failure of furniture panels edge-glued on the automatic press, so much so that the panel lamination process had to be transferred to the two manually operated clamp carriers. Here, however, glued-up panels tended to buckle when clamped because of the absence of a hold-down accessory (see Annex VIII) As a follow-up to the plant visit, the consultant contacted the manufacturers of the press asking to provide guidance to the factory management on remedial steps to be taken in order to overcome the gluing problem. In the consultant's opinion, the utilization of proper clamp carriers would have been preferable to the investment in the costly and sophisticated automatic edge-gluing press.

The quality of end-grain moulding of furniture components such as shelf boards could be greatly improved by feeding the workpiece on the spindle moulder with the aid of a sliding-table attachment, instead of feeding it by hand. The quality of wood machining, both in moulding and sawing operations could also be improved by utilizing moulding

cutters and sawblades of cutting edge geometry suitable for the processing of pinewood, and by adopting proper jigs.

A wood processing quality problem is also posed by the absence of proper tool maintenance equipment. In fact, while the sawmill in the WICO complex is provided with appropriate sawdoctoring machinery, the only tool maintenance equipment available in the furniture plant is a knife grinder and a narrow band-saw sharpener, while moulding cutters and boring bits are sharpened free-hand on a bench grinder. The most urgent piece of equipment required in this respect is a universal type of sharpening machine which would deal with the maintenance of all machine cutting tools with the exception of standard circularsaw blades (see Annex VI).

With respect to furniture design, there would be scope to simplify the construction of case good furniture along the concept of modular furniture so at to maximize the benefits of serial production and reduce production costs (see illustration of a modular storage cabinet system in Annex IV).

In conclusion an overall improvement of WICO operating cost-efficiency would allow the reduction of selling prices of finished products and the extension of market outlets to Malawian lower-income groups.

PTA context: The WICO furniture plant is not only the most modern one in Malawi, but can also be considered as one of the leading furniture plants in the PTA subregion engaged in the production of furniture made of plantation timber. The other two leading plants in this respect are the Swazi Pine in Kwaluseni in Swaziland and the Kist Production

Unit in Kiambu, kenya. It is recommended that the WICO and the Kist furniture plants be selected to host "Eye opener" seminars to expand the manufacturing know-how of an initial group of managerial staff in the furniture and joinery industry sector from PTA member states (see Objective no. 1 in Recommended Follow-up Chart on page 33).

2.3 The International Timber Ltd (ITL), Limbe (former Imperial Timber Ltd.)

First established in 1907 as a trading company, the ITL woodworking complex remained the only manufacturer of wood-based panels in Malawi until the recent establishment of the VIPLY woodworking complex in the North of Malawi. The total input of the complex consists of 30,000 m3 of eucalyptus saw logs and 4,000 to 5,000 m3 of veneer logs a year. Thus ITL remains to date the largest woodworking operation in the country. The main primary wood-processing activities include the production of sawnwood, plywood and blockboard; whereas the main secondary wood products include gluelam building components (1,500 m3 a year); edge-glued furniture panels; flush doors (17,000 pcs. a year); tea chests; pallets; and tobacco cases.

The major raw material input derives from ITL's 2,500 ha of Eucalyptus saligna plantation. Eucalyptus peeling logs of a minimum of 225 mm in diameter are rotary peeled down to 125 mm in diameter and are then utilized to produce batten core for blockboard production.

Eucalyptus saligna is also the only species utilized by the ITL for the production of gluelam building components and furniture components.

PTA context: ITL has pioneered the production of Eucalyptus gluelam products in developing Africa. The manufacture of this particular wood product was first introduced in 1978 on the basis of the study, "Strength Properties of Laminated Beams of Eucalyptus Saligna Grown in Malawi", commissioned by ITL to the National Timber Research Institute Council for Scientific and Industrial Research, Pretoria. An extensive use of Eucalyptus has also been made in another PTA country, Ethiopia, where this plantation species is utilized as a raw material input in the production of particleboard and hardboard. Furthermore, for decades eucalyptus poles have been very effectively used in Ethiopia for the fabrication of roof trusses in practically all modern buildings of pitched roof design in urban areas. The adoption of this building technique in Malawi could contribute to bringing down considerably building construction costs. In view of its multi-use advantage and of its fast-growing characteristic, it is recommended that eucalyptus be included in a proposed study to be prepared by the FAO/PTA/UNIDO project with the aim to expand and improve the capability of efficiently utilizing fast growing plantation species in the PTA sub-region (see Objective no.5 in Recommended Follow-up chart on page 36).

2.4 The Shire Ltd Joinery/Furniture Factory, Limbe

Established in 1964 by expatriate residents, Shire Ltd is the largest supplier of building materials in Malawi. The output of its woodworking plant with a manpower of 100, was originally absorbed entirely by the company's own building construction projects. Nowadays, however, building construction has ceased to be the company's dominant activity and its semi-manufactured and manufactured wood products are aimed to fulfil the requirements of the general market instead. The company is currently fully managed by Malawian personnel.

Raw material input consists mainly of sawnwood supplied by pit sawers. Main products include flush and batten doors, window frames, roof trusses in pinewood, planed timber, moulded timber and prefab cabins utilized as site office accommodations in construction projects.

The standard prefab roof trusses in pinewood cover spans from 3 to 9.5 meters and are assembled by means of gang nail connectors. School desks are made of edge-glued eucalyptus panels supplied by the International Timber Ltd and assembled on tubular steel frames. The company also operates a timber yard for the supply of un-seasoned and seasoned sawnwood to the market.

Shire was previously involved in the production of a standard range of modular kitchen cabinets with a choice of formica-faced or solid-wood doors. The production of this line has been nearly discontinued in view of the diminished house-building activities of the company.

The plant is equipped with a complete line of rough-mill machinery including a band saw machine with automatic feed, and nearly a full range of intermediate type of machinery for joinery/furniture production. Also available are kiln drying facilities with a total capacity of 18 m3. Most of the wood-processing equipment is too old to provide satisfactory performance so far as the manufacture of quality furniture is concerned. A negative experience has been encountered with the utilization of a newly purchased wide belt sander because of the difficulty in running it properly. Similar difficulties have been encountered in the use of this type of relatively sophisticated machine at the WICO plant in Malawi as well as in other PTA countries such as Kenya and Ethiopia.

Shire is one of the very few secondary wood-processing plants in Malawi equipped with most of the required tool maintenance machinery, including a manual sharpener for carbide-tipped circular saws. However, the utilization of this equipment is limited by the lack of necessary accessories and supplies, such as for example the lack of attachments for the universal sharpening machine, and spare diamond grinding wheels.

2.5 The Capital Furniture Factory, Lilongwe

Established in 1979, the Capital Furniture Factory with a work-force of 35 is the most modern furniture plant in terms of equipment in Lilongwe. Its production covers the whole range of household furniture excluding kitchen

cabinets. The plant has also produced interesting prototypes of carved furniture and is equipped for the manufacture of flush doors.

As with most of the other furniture plants in Malawi, with the exception of WICO; the main raw material input of the Capital Factory consists of sapele-veneered blockboard. The average annual consumption of this material is about 2000 sheets.

The plant is equipped with all basic woodworking machinery plus a stroke belt sander and a manually operated screw press for the production of flush doors, but lacks tool maintenance equipment.

The Capital's management is considering expanding its plant production facilities. In fact, a new factory building is already being made available for this purpose. It is recommended that the management of this particular plant be given the opportunity of attending the proposed "Eye opener" seminar of PTA scope designed to deal with all the critical topics of plant design and operation (see objective no.1 in Recommended Follow-up chart on page.33).

2.6 The Press Furniture and Joinery Ltd, Blantype

The Press furniture factory is part of the highly diversified Press (Holdings) Ltd, a conglomerate of companies that with its agricultural subsidiary, General Farming, may well account for 30 per cent of Malawi's economic activities. In addition to wood products, Press's industrial activities cover canned food, clothing and bakery products. The company

also operates an extensive transportation network which helps market its products country-wide.

Established in 1972, Press Furniture has a factory manpower of 120 and is engaged in the production of furniture for the medium/higher end of the market. It manufactures both household and office furniture, and 60 per cent of the output consists of upholstered lounge suites. The main market outlets are Blantyre, Lilongwe and Mzuzu. Some 50 per cent of the production consists of standard designs, the remaining of made-to-order furniture as well as of shop fittings and interiors.

Total sawnwood consumption amounts to about 1,800 m3 a year, of which one third consists of pinewood and two thirds of hardwood species. The latter include mainly two indigenous species Mbawa (Mahogany) and Mlambwa as well as hardwood imported from Mozambique. Most of the wood-based panels used in the plant consist of locally produced blockboard faced with imported sapele veneer.

In addition to a complete range of basic woodworking machinery, the Press plant is equipped with a multiple-rip saw, a new automatic turning lathe (not utilized), a wide belt sander, a very old four-side moulder and two single-end tenoners. In addition, the Press factory is also one of the very few furniture/joinery plants in Malawi to be equipped with a dry kiln, although it shares with the majority of the other plants the lack of proper tool maintenance equipment.

In spite of the wide range of machinery available, the Press plant operates rather inefficiently because its

working methods are based more on the artisanal than on the industrial system. The major problem in this respect is the absence of furniture designed for industrial production. Furthermore, the benefit of serial production is minimized by too wide a range of standard designs, 130 of them, and by very small production batches.

2.7 The Wudstil Furniture Factory, Lilongwe

First established in 1958 and re-equipped in 1972, the Wudstil Furniture Factory employs a total of 70 workers and specializes in the production of office furniture, which takes 75 per cent of the total sales volume. Main materials used are formica-faced blockboard panels and steel frames. Household furniture consists mainly of bedroom items. Two thirds of furniture is sold to private companies and one third to government departments.

Consumption of blockboard amounts to an average of 125 sheets a month. Commercial blockboard used for Formica facing is supplied by the International Timber Ltd of Limbe; whereas blockboard with sapele facing is imported from South Africa and Zimbabwe. The plant offers a choice of some 300 "standard" furniture items which are produced one by one as orders are received. Most furniture, with the exception of a type of easy chair of British design, is of unnecessarily heavy construction and is assembled with clumsy, time-consuming methods.

The plant is equipped only with three old machines including two combined jointing/thicknessing machines and a

circular bench saw. No tool maintenance equipment is available but for a bench grinder. According to the management the company relies on the tool maintenance services provided by the Ministry of Works. However, this does not appear to be the case from the conditions of the cutting tools, especially circular sawblades, in use on the machinery at the time of the consultant's visit.

2.8 The S&K Steel Furniture Factory, Limbe

Established in 1968, the S&K Furniture plant is possibly the largest furniture making enterprise in the private sector in terms of manpower. It is located on a two hectare site and has a work force of 140, of which 125 engaged in wood-processing operations and 15 in metal-work activities. The plant is engaged in the production of a wide range of household and office furniture of medium-quality standard. It serves the furniture requirements of both private customers and government projects. The main market outlet is Blantyre where the company operates a showroom; while sales in the Lilongwe district are handled through a dealer. Annual furniture sales amount to F 2,5 to 3 million.

Average raw material inputs per year were given as 2,500 m3 of sawnwood and 4,500 sheets of blockboard. Sawnwood input is limited to hardwood. Woodworking equipment includes only basic machinery. There is no proper tool maintenance equipment and this is reflected in the very poor conditions of sawblades and cutters in use in the factory. As with most of the other furniture factories operated by Asians, S&K has

not been contributing much to the development of the furniture industry sector in terms of utilization of modern and efficient production methods and appropriate product design. However, the plant is now experimenting with the production of an office desk whose design is more in keeping with the requirements of industrialized production.

2.9 Famba Furniture Workshop, Limbe

Established in 1988 with a loan from the Small Enterprise Development Organization of Malawi (SEDOM), the Famba furniture enterprise is one of the very few Malawian-owned private furniture factories in the manufacturing sector. The workshop consists of a covered area of only 300 m2 on a site of 1,830 m2. Thus a number of operations such as sanding and finishing are carried out in the open.

Furniture is sold directly from the factory as well as from Famba's own showrooms in Blantyre and Lilongwe. The furniture range includes fully upholstered lounge suites (65 percent of the output), office furniture (20 per cent) and dining/bedroom furniture. The workshop is also engaged in the production of cupboards with hand-carved features (see figure 4).

Raw material consumption includes an average of 17m3 of sawnwood and 30 sheets of ready-veneered blockboard a month. Pinewood and eucalyptus are utilized for hidden upholstered frames, whereas local hardwood (Mlambwa and Mbawa) is used for exposed furniture components.

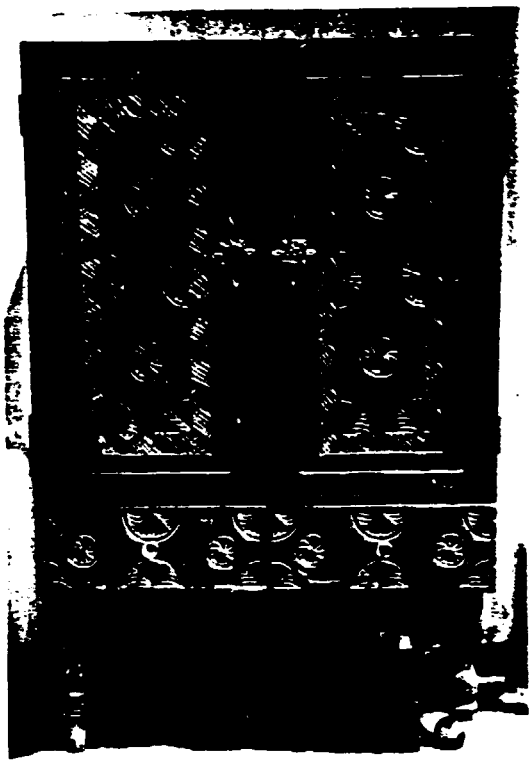

Figure 4 Cupboard with hand-carved features produced by the Famba Furniture Workshop

Figure 5 Bed and dining chair produced by the Famba Furniture Workshop

The workshop equipment consists of four small basic machines of which two (a circular saw bench and a drill press) were imported and two (a turning lathe and a circular saw bench) were improvised by the owner/manager. The workshop is not only under equipped in terms of basic machines but, with the exception of the turning lathe, none of the other machines are such as to provide a minimum standard for accuracy in wood machining.

Because of the good initial market response, Famba's owner is now planning to move the workshop facilities to a bigger site at the industrial estate and acquire more adequate types of machines. It is recommended in this respect that he be given the opportunity to participate in the proposed seminar on the development of the small scale woodworking industry to be organized and conducted by the FAO/PTA/UNIDO project (see Objective no.4 in Recommended Follow-up chart on page 35).

3 Development of small-scale woodworking enterprises

The Malawian government has assigned a high priority to the development of Small-Scale Manufacturing Enterprises (SSME) especially in rural areas and smaller urban centres. The rationale of this approach is that such enterprises are labour intensive, tend to use indigenous skills and materials, are frequently located in the countryside, and would not only boost off-farm employment and income but also help arrest rural-urban migration. Two

organizations are involved in the promotion of small-scale enterprises: the Development of Malawi Traders Trust (DEMATT) - which is now being geared to advise also on market opportunities, technology and equipment purchase - and the Malawian Entrepreneurs Development Institute (MEAD) which provides combined training in entrepreneurship and technical skills development.

PTA context: The promotion of small-scale workshops and cooperative enterprises of both servicing and manufacturing type is a development priority adopted by other PTA member states, especially by Kenya, Ethiopia and Lesotho. It is therefore recommended that technical assistance be provided by the FAO/PTA/UNIDO project to help develop the efficiency of this particular sub-sector of the woodworking industry in the PTA sub-region as a whole (see objective no.4 in Recommended Follow-up chart on page 35).

4 Utilization of raw materials

4.1 Natural forests

Woodlands and forests cover about 38 per cent or 3.6 million ha of Malawi's total 9.5 million land area. A combination of land clearing for agriculture and wood consumption for fuel by a rapidly growing population has led to a very high rate of degradation of the natural forest resources. In fact, total forest cover is declining by an

estimated 3.5 per cent a year, with much higher deforestation rates in certain areas.

Indigenous forests are generally of the Brachystegia/ Jubernadia/ Isoberlinia formation and are very open. They have few commercially exploitable species. Widely scattered groups of trees of Pterocarpus angolensis, Khaya nyasica and a few other decorative species are in demand for sawn timber.

4.2 Industrial timber plantations

In Malawi, conservation measures for natural resources have been steadily developed since the beginning of the century with the development of plantation forests. In fact, plantations of a local softwood species, Mulanje cedar (Widdringtonia nodiflora, where first established in 1906. With its slow growth rate, the government was obliged to commence investment in exotic fast growing species. The first experiments in pinewood plantations where made in 1936. In the late 1940's, small plantations where established in Blantyre, Somba, Dedza, and on the Viphya Plateau. By 1974, steady investment had built up timber plantations covering 35,100 ha, almost 80 per cent of this on Viphya Plateau in the north.

By 1980, the total plantation area had grown to 15,140 ha and by 1989 to as much as 91,500 ha, according to the Department of Forestry (See Plantation Table in Annex VII). The main plantation species consist of the exotic conifers Pinus kesiya and Pinus patula.

The total area planted with pine species amounted to 68,100 ha in 1985. 1/ Eucalyptus camuldulensis and Eucalyptus grandis are the main exotic hardwood species. Some 4.8 per cent of the total plantation stock is in tropical hardwood.

The largest plantation area (exotic conifers) remains in the Northern Highlands which offer little agricultural promise and retain most of the potential for future expansion. The Viphya plantation forest of 53,000 ha in the North had originally been reserved for the establishment of a wood pulp industry in the country. Later, however, due to changed project feasibility economics, the plans were revised to utilize about 17 per cent of those resources for the newly established integrated sawmill and panel mill VIPLY.

According to the government report "Statement of Development Policies, 1987-1996", the plantation forests supplied in 1986 most of the domestic requirements for sawnwood (40,000 m3), plywood and laminated wood (4,000 m3). Currently, however, some blockboard faced with decorative veneer and some hardwood sawn timber is still being imported.

The same report indicates that for the foreseeable future, there would be no need for investment in new timber plantations because there is enough stock to meet domestic demand. Only replanting of areas of softwood being clear felled or which have been damaged will continue to be undertaken.

PTA context: Malawi is the PTA member state with the third largest timber plantation resources. The country

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1/ Source: H. Nielsen, Report FIAG/85/23, 1985 (1986 revision).

with the largest plantation area is Kenya with 165,000 ha followed by Zimbabwe (100,000 ha), Swaziland (99,000 ha), Malawi (91,500 ha, based on 1985 figures), Tanzania (65,300 ha), Zambia (60,000 ha), Uganda (21,200 ha), Burundi (19,000 ha), Seychelles (10,600 ha), Mauritius (9,000 ha), Rwanda (5,500 ha), and Somalia (1,000 ha). With a view to expand the know-how on the efficient utilization of the main fast growing plantation species (Pinewood, Cypress and Eucalyptus) in the secondary wood-processing industry in the PTA as a whole, it is recommended that the FAO/PTA/UNIDO project prepare reference papers in this context to cover experience gained both in the sub-region and overseas (See Objective no.5 in Recommended Follow-up Chart on page 36).

5 Priorities in the modernization of the furniture/joinery sector

5.1 Selection of machinery

The main priorities for expanded know-how in the selection of equipment are as follows:

(a) Development of specifications of power tools and basic machines for the introduction of an initial degree of mechanization in micro-scale workshops;

(b) Development of specifications for the introduction of intermediate type of machinery taking into account the conditions and requirements of the local industry.

The main aspects to be considered in the selection of equipment are as follow: output capacity requirements; co-ordinated relationship with other equipment in order to avoid production bottle-necks; ease of maintenance; and availability of accessories designed to increase the versatility of operation of given machines.

A similar urgency exists in the selection of proper tool maintenance equipment.

5.2 Selection of cutting tools

The need also exists for the introduction of machining tools of modern design as a means of increasing the quality of machined surfaces, simplifying tool sharpening requirements and reducing safety hazards. A particular need in this respect is the adoption of tools of appropriate cutting edge geometry to help overcome surface quality problems encountered in the processing of plantation timber.

5.3 Interchangeability of parts

So far as the actual manufacturing process is concerned, the major challenge faced by the formal furniture/joinery sector in attaining a truly industrial

basis - that is in fully benefiting from the economy of the industrial system - is to develop a capability to produce fully interchangeable wood-machined parts, thus avoiding the time consuming and costly practice of adapting machined parts one by one by hand to fit them together during assembly. The essential know-how to be mastered in this connection includes: engineering of products as applicable to industrial production; preparation of appropriate product/process documentation as a reference in manufacturing; adoption of appropriate quality control methods and instrumentation; design and utilization of jigs as a means of attaining accuracy of works as well as for ensuring safety of operation.

5.4 Product design

The development priority with respect to product design refers to capability of designing furniture by taking into account the requirements and potential of industrialized production. In particular, a radical shift is to be attained in the design of storage cabinets (wardrobes, bookcases, sideboards, etc.) from the current fixed-purpose concept followed in Uganda, to the modern, versatile modular system, whereby panel components of various standard sizes are assembled together according to various end uses as required by individual customers. The modular system allows to increase the size of production batches so as to optimize the benefits of serial production. See Annex IV.

5.5 Tool and machine maintenance

Regular and proper maintenance of machine cutting tools serves not only to extend their life span - thus reducing foreign exchange requirements for tool replacement - but also to improve the quality of processed parts and to help reduce safety hazards in the operation of machinery. The main concern with regards to preventive machine maintenance should focus on the introduction of proper lubrication methods. In fact, the replacement cycle of critical machine parts such as high-speed bearings is sharply accelerated unless they are lubricated at given frequencies, varying from machine to machine, and with the appropriate amount and grades of lubricant, according to the requirements of each individual lubricating point. Rapid wear of bearings can also result from cutting tools, such as moulding cutters, made unbalanced by improper sharpening.

5.6 Other modernization requirements

Other areas of required modernization include:

(a) Plant layout as a means of facilitating handling materials at given work stations, obtain a rational flow of work-in-progress, and ensure an organic relationship between manufacturing and service facilities.

(b) Introduction of Quality Standard Specification with regards to selected durability and performance

requirements (as applicable to furniture, joinery, and structural building components made of main plantation species) such as choice and strength of joints, toughness and wear of surface coating, wood treatment, selection of adhesives, minimum cross section of components as related to structural strength, dimensioning of furniture according to function, etc. The standards would provide consumers in local and regional markets, especially government institutions, with specification reference when placing orders and accepting products on delivery.

(c) Plant organization applicable to various sizes of furniture and joinery enterprises, as a means of defining essential functions, responsibilities and their organic relationship, and of facilitating production control and overall operating efficiency.

5.7 Training services

One of the main constraints faced in the development of the secondary wood-processing sector is that existing formal training institutions are not geared towards conducting training programmes, either for skilled labour or supervisory personnel, based on the actual operative needs of the industry. Furthermore the courses at the Forestry College at Dedza have remained heavily oriented towards forestry as opposed to forest industries, even though the Malawian

Government's involvement in wood processing has grown enormously.

PTA context: As the training gap is shared by most PTA member states, it is recommended that initial technical assistance of sub-regional scope be provided by the FAO/PTA/UNIDO project in this context to include the following:

(a) "Eye opener" seminars

(b) Specialized seminars to cover particular subjects,

(c) Preparation of training and reference manuals dealing with those critical aspects of furniture and joinery manufacture not adequately covered in existing curricula of Technical Schools and Polytechnics. This would serve to gear existing formal training institutions to fulfil on a long-term basis the needs of the industry for skilled labour and supervising personnel without having to set up ad-hoc training centres. The manuals would also be utilized as a reference in in-service and on-the-job training of personnel already employed in the industry.

Details of the above mentioned, proposed activities are given in Chapter III of this report.

OBJECTIVES	OUTPUTS	MAIN ACTIVITIES	INPUTS
Objective 1 To expand the manufacturing know-how of an initial group of managerial staff in the furniture and joinery industry sector from Malawi and the other PTA countries aimed at optimizing the benefits of industrialized wood processing. (Refer to Modernization Priorities pages 27 to 31)	Output 1.1 60 plant managers and production supervisors gained an appreciation of all critical aspects involved in the serial production of standard furniture and joinery, towards increasing productivity, quality standards and overall operative efficiency. The areas of expanded know-how include: selection of machinery; selection of cutting tools; inter-changeability of parts and quality control; product costing; tool and machine maintenance; general techniques of surface staining and coating; plant layout; product design as applied to industrialized production; quality standard specifications; plant organization. (Objective 1 and Activities 1.1 to 1.3 refer)	Activity 1.1 To survey proposed host facilities in Kenya and Malawi 1/ in order to discuss Seminar arrangements, prepare a tentative Work Programme and specifications of production supply items (such as quality control instruments, jig accessories, special cutting tools, etc.) to be purchased under the project for seminar demonstration work. Activity 1.2 To prepare terms of reference for the Lecturers and final Work Programmes. Activity 1.3 To conduct 2 General Seminars of two weeks each with 30 participants at each seminar in Kenya and Malawi respectively.	- 33 -
Objective 2 To provide a basis for: (a) An increasingly relevant role on the part of Polytechnics and Technical Schools in Malawi and the other PTA countries in stimulating a proper transition of the furniture and joinery sector from artisan methods to the industrial system; and (b) A permanent reference source on plant operation for the management of furniture and joinery plants. (Refer to paragraph 5.7, page 32)	Output 2.1 Produced a set of woodworking Training/Reference Manuals covering the main topics dealt with in Output 1 above. (Activities 2.1 and 2.2 refer)	Activity 2.1 Collect and review woodworking text books dealing with industrial techniques, in use in Polytechnics and Technical Schools in the PTA. Activity 2.2 Adaptation of existing UNIDO woodworking manuals and preparation of new ones, as required, to cover the topics in Output 1.1 1/ Proposed hosting furniture plants: (1) IST Production Unit, in Kiambu, Kenya; and (2) WIDCO Furniture Plant, in Blantyre, Malawi	

OBJECTIVES	OUTPUTS	MAIN ACTIVITIES	INPUTS
Objective 3 To provide the basis for the improvement of tool maintenance methods of the furniture and joinery industry in Malawi and in the other PTA countries in order to attain: longer life span of costly imported machine cutting tools; quality improvement of machined parts; reduced safety hazards in the use of machinery; and reduced material reject rate. (Refer to paragraph 5.5, page 30)	Output 3.1 Three Project Profiles on the setting up of tool maintenance units within small- and medium-scale furniture/joinery plants, or as self-contained Tool Maintenance Centres. The Profiles include: workshop layout; specifications and estimate cost of machinery, accessories and supplies for a two-year operation; specifications of storage arrangement for tools and supplies; lighting requirements, etc. (Activity 3.5 refers) Output 3.2 Trained 24 senior technicians in carrying out the maintenance of machine cutting tools in use in the furniture/joinery industry such as; planing knives, moulding cutters, routing cutters, standard circularsaw blades, carbide tipped circular saw blades, narrow bandsaw blades, blades for band resawing, mortising chains, square chisel mortiser bits, and boring bits. The participants would subsequently act as counterparts in similar courses to be conducted at a national level. (Activities 3.1, 3.2, 3.3 and 3.4 refer) Output 3.3 Extended the utilization of the Project Profiles and Data Sheets prepared for the training course for the benefit of the PTA furniture/joinery industry as a whole. (Activity 3.6 refers)	Activity 3.1 To survey the tool maintenance workshop of the Warca Furniture Factory and the WUAFC Tool Maintenance Centre in Addis Ababa which, being representatives in the PTA of well-equipped tool maintenance facilities for the furniture and joinery industry, qualify for hosting the Tool Maintenance Training Courses. Activity 3.2 To prepare specifications of supplies and accessories to be purchased for the purpose of conducting the training courses. Activity 3.3 To prepare training Data Sheets and visual aids as a basis for conducting the maintenance courses. Activity 3.4 To conduct 3 training courses on Tool Maintenance Techniques of one month duration each for 8 PTA trainees at a time. Activity 3.5 To prepare Project Profiles as a reference on the setting up of tool maintenance units. Activity 3.6 To reproduce and distribute widely, in the secondary woodprocessing industry, the Project Profiles and Data Sheets prepared under the project.	

OBJECTIVES	OUTPUTS	MAIN ACTIVITIES	INPUTS
Objective 4 To provide a sound basis for the establishment and operation, in Malawi and the PTA, of micro-scale furniture and joinery workshops and service cooperatives. (Refer to page 22)	Output 4.1 Produced 3 Project Profiles for the establishment of two typical micro-scale furniture/joinery enterprises and a typical service cooperative as follows: (a) Micro-scale workshop equipped with power tools and basic multipurpose woodworking machinery; (b) Wood-machining cooperative service workshop, of the type operated by BEDCO in Lesotho, with a full range of basic woodworking machinery for use by a number of micro-scale entrepreneurs. (c) Micro-scale workshop equipped with basic machinery for the production of bamboo furniture. The profiles include: detailed specifications and cost of equipment; details of workshop facilities; workshop layout; specifications of typical low-cost dining room, living room and bedroom furniture. (Activities 4.1 and 4.2 refer) Output 4.2 Produced a set of simple Reference Data Sheets on basic technologies as applicable to the operation of micro-scale woodworking enterprises, such as proper adjustment of machines, basic requirements in the sharpening of cutting tools, use of simple jigs and machine accessories, basic costing methods, etc. (Activity 4.3 refers)	Activity 4.1 Survey of Seminar host facilities (BEDCO Woodworking Service Unit at Maseru, Lesotho) in order to: - prepare detailed programme of Seminar and terms of reference of Lectures - select furniture/joinery items already produced by BEDCO entrepreneurs, and adapt them as required to serve for production demonstration sessions during the Seminar - to prepare specifications of supplies to be purchased for the Seminar. Activity 4.2 To prepare 3 Project Profiles for the establishment of typical micro-scale enterprises for presentation and discussion at the Seminar, and for permanent reference of entrepreneurs and institutions concerned with the development of the sector. Activity 4.3 To prepare Reference Data Sheets on basic woodworking technologies as applicable to micro-scale woodworking enterprises, for utilization at the Seminar and for permanent reference of entrepreneurs and training institutions. Activity 4.4 To conduct a two-week seminar at BEDCO for 30 PTA entrepreneurs of micro-scale woodworking enterprises and government officials responsible for the promotion of the sector.	

OBJECTIVES	OUTPUTS	MAIN ACTIVITIES	INPUTS
Objective 4 continued -	Output 4.3 30 government officials and entrepreneurs of the PTA member states gained an appreciation of critical factors to be considered in the promotion, establishment, and operation of micro-scale furniture/joinery enterprises and woodworking service cooperatives. Gain also derived from exchanging experience on the development of micro-scale enterprises. (Activities 4.1, 4.2, 4.3 and 4.4 refer) Output 4.4 Extended the utilization of the Project Profiles and the Data Sheets prepared for the Seminar for the benefit of the PTA furniture/joinery sector as a whole. (Activity 4.5 refers)	Activity 4.5 Reproduction of Project Profiles and Reference Data Sheets for wide distribution in the PTA.	
Objective 5 To expand the capability of efficiently utilizing, in Malawi and in the other PTA countries, fast growing plantation timber species (such as Pinus patula, Eucalyptus spp. and Cypress Lusitanica) in the furniture and joinery industry as well as in building construction. (Refer to paragraph 5.6 page 30)	Output 5.1 Report on the use of Eucalyptus in the PTA and overseas for the production of furniture, joinery, structural building components and wood-based panels. (Activities 5.1, 5.2, 5.3 and 5.6 refer) Output 5.2 Manual on standard wood treatment and wood processing requirements of Eucalyptus, Pine, and Cypress, to cover subjects such as: kiln drying; cutting speeds; cutting-tool geometry with respect to main wood machining operations; choice of surface coating material and methods; dipping against blue stain and pressure treatment of Pine; choice of adhesives for standard and structural applications; choice and dimensioning of joints in chair manufacture. The manual shall also propose a set of minimum quality standards for furniture intended for intra-Pta trade and for government contracts. (Activities 5.4 and 5.6 refer)	Activity 5.1 Review the experience gained by the International Timber Group in Blantyre, Malawi, in the manufacture of furniture components, joinery and structural building components made of laminated Eucalyptus. Activity 5.2 Review the experience gained by ETHARSO and ECAFCO plants in Addis Abeba, Ethiopia in the manufacture of fibreboard and particle board made of Eucalyptus. Activity 5.3 Compile information on overseas experience in the utilization of Eucalyptus in the primary and secondary wood processing industry.	

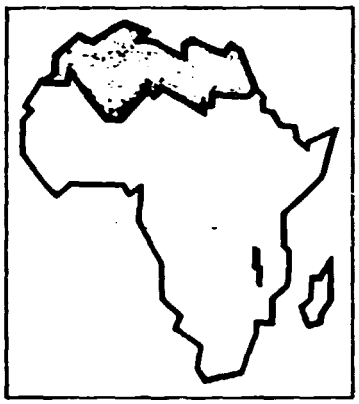
OBJECTIVES	OUTPUTS	MAIN ACTIVITIES	INPUTS
- Objective 5 continued -	Output 5.3 Reference Manual on the design of standard roof trusses made of Pine and Cypress, and on the design and fabrication of roof trusses made of Eucalyptus poles as practiced in Ethiopia. (Activities 5.5 and 5.6 refer)	Activity 5.4 Compile information from African and overseas research institutions, including Bureaus of Standards, on woodprocessing requirements and durability and performance standards as applicable to the use of Eucalyptus, Pine and Cypress in furniture and joinery production and structural building applications. Activity 5.5 Compile information from African research institutions and ministries of works on the use of Pine, Cypress, and Eucalyptus in the design and fabrication of roof trusses. Activity 5.6 To reproduce the report and manuals under outputs 5.1, 5.2, and 5.3 for wide distribution to the industry, wood research institutions, and ministries of work in the PTA.	

LIST OF PERSONS MET AND OF PLANTS/INSTITUTIONS VISITED

1	Mr P.A.P. Matsuka Senior Industrial Dev. Officer	Ministry of Trade, Industry and Tourism, Lilongwe Tel. 732711
2	Mr C.C. Kachiza Industrial Dev. Officer	"
3	Mr P.S.W. Nkaonja Chief Forest Officer	Forestry Department P.O.Box 30048, Lilongwe Tel. 734144 telex 44465 FORENAR MI
4	Mr D.P.K. Mjojo Planning Officer	"
5	Mrs Gunda Regional Trade Officer	Ministry of Trade, Industry and Tourism Kanabar House, Victoria Avenue Blantyre. Tel. 620422
6	Mrs Chirambo Regional Trade Officer	"
7	Mr A.J. Bobe Programme Officer	UNDP Office P.O.Box 30135, Lilongwe 3 Tel. 730566 Telex. 44466 UNDP MI
8	Mr Adamson Tong'o Assistant Operation Manager	Wood Industries Corp. Ltd(WICO) P.O.Box 30359 Chichiri, Blantyre Tel. 670144 Telex. 4707 WOODCOR
9	Mr E.W. Mulanje Assistant Plant Manager	"
10	Mr Manichwanda Floor supervisor	"
11	Mr D.G. Lloyd Managing Director	International Timber Ltd (ITG) P.O.Box 5050, Limbe Tel. Blantyre 640 399 Telex. 44248
12	Mr T. Malinga Acting Joinery Manager	Shire Ltd P.O.BOX 5491, Limbe Tel. 651011 Telex. 44143
13	Mr Harun Rashid Dand Assistant Managing Director	Capital Furniture Co. Ltd. P.O.BOX 676, Lilongwe

14	Mr H.N. Bolton General Manager	Press Furniture and Joinery Ltd P.O.BOX 30221, Chichiri, Blantyre Tel. 632666 FAX. 671138
15	Mr Farruq Sattar Managing Director	WUDSTIL Furniture (PVT) Ltd P.O.BOX 505, Lilongwe Tel. 765356 Telex. 4626 WUSTIL MI
16	Mr Fanit Gopaldas Director	S&K Furniture Co. Ltd. P.O.BOX 5043, Limbe
17	Mr F.M. Sinalo Managing Director	Famba Furniture P.O.BOX 5945, Limbe Tel. 652787. Telex. 4148 ABEGG MI
19	Mr Su Shui Mu Managing Director	Chinese Engineering & Furniture P.O.BOX 2593, Naperi, Blantyre Tel. 634293

MALAWI



Area: 94,080 sq. km. (including 24,000 sq. km. of water).

Population: 79 million (1987)

Capital: Lilongwe.

Principal Towns: Blantyre, Limbe, Zomba, Mangochi and Nkhotakota.

Date of independence: 6 July 1964.

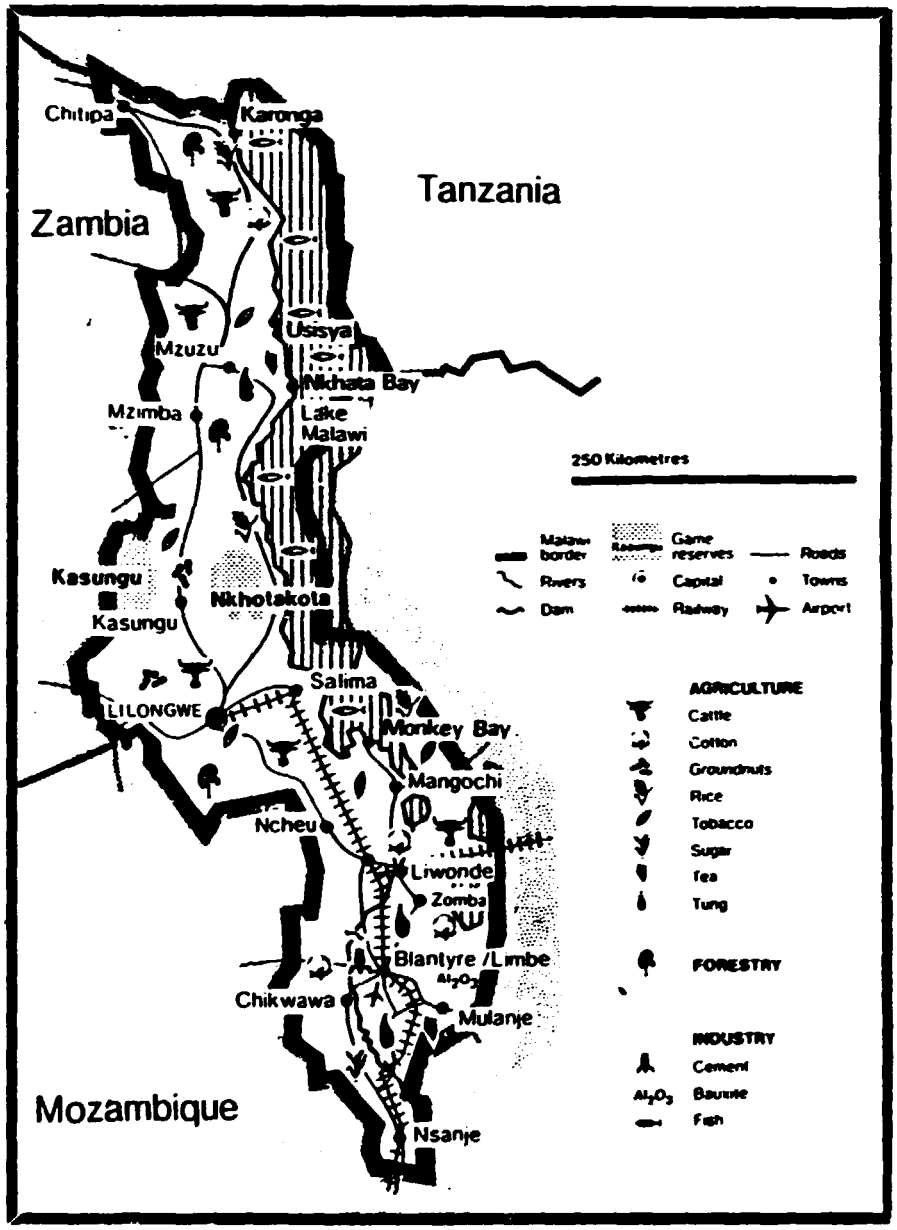
Head of State: President Hastings Kamuzu Banda (Life President).

Government: National Assembly of 81 elected members and 15 nominated by the President, who exercises firm control of the single party, the Malawi Congress Party (MCP).

Languages: English and Chichewa are the official languages. Other African languages are spoken.

Religion: Christianity (50%) and Islam (30%).

Currency: Malawi Kwacha divided into 100 tambala.

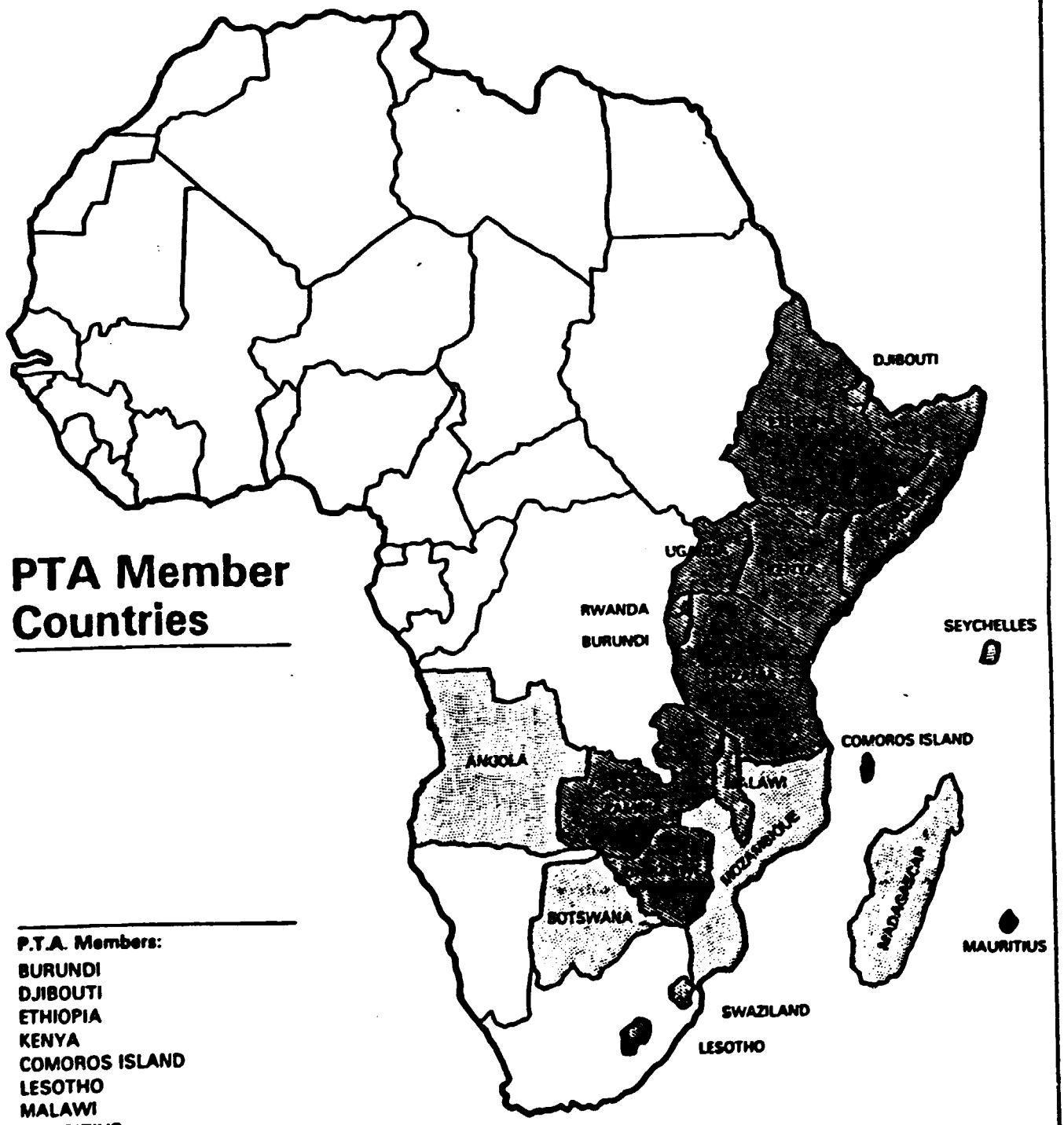


GENERAL INFORMATION

Geography: The huge lake lies in the Great Rift Valley which dominates Malawi; the lake forms most of the eastern boundary of the country and covers about 20% of the total territory. High plateaux rise from the lake shore. There are mountain areas in the south, including Mount Mulanje and Zomba Mountain.

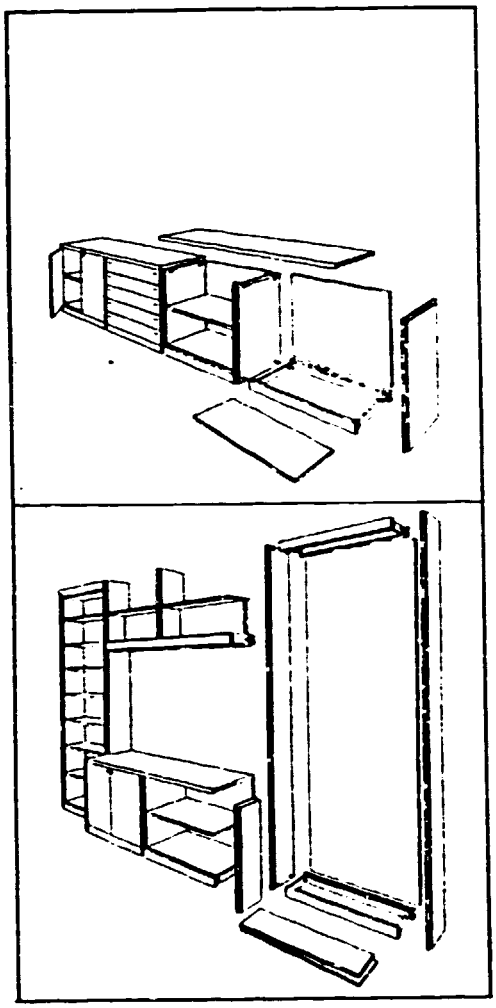
People: A densely-populated agricultural country with a pleasant climate. Malawi is the home of six major ethnic groups: the Chewa, predominant on the lake shore; the Yao of the southern lakeshore; the Chipok of the central region; the Tonga of the northern region, the Tumbuka and the Ngonde.

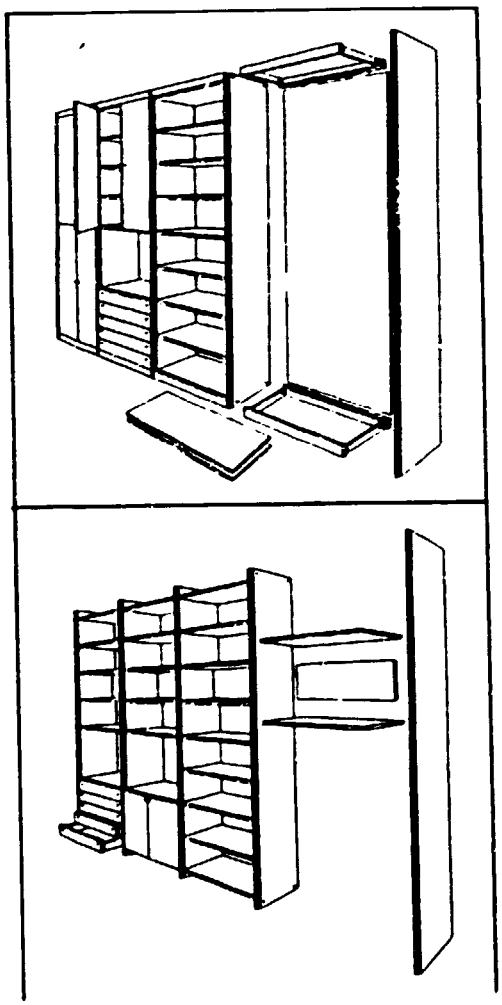
MAP OF THE PTA MEMBER STATES



The boundaries shown on this map do not imply official endorsement or acceptance by the United Nations Industrial Development Organization.

MODULAR TYPE OF STORAGE CABINET SYSTEM





Check list of woodworking factories in PTA countries whose operation and products could be of interest to Malawian manufacturers

1 MAURITIUS

1.1 Reunion Ltd & Partner (Panache)
Products: High class furniture of Louis XV type manufactured by combining hand-carved with efficient woodmachining methods.
Address: Industrial zone - Saint Pierre, Mauritius
Telex 4246 DIVIDEN IW, Tel: 534111

1.2 Mauricarvers Ltd
Products: Reproduction furniture of Louis XV and Victoria type. High labour intensive.
Address: P.O.Box 744, Bell Village, Mauritius

2 LESOTHO

2.1 BEDCO Servicing Centre for micro-scale furniture enterprises
Services: Common woodmachining shop; provison of timber supply at wholesale prices and on credit; marketing of products.
Address: BEDCO Industrial Estate, Maseru

2.2 Foli Furniture Ltd
Products: Innovative type of contemporary furniture made of glue-laminated components.
Address: BEDCO Industrial Estate, Maseru

2.3 Lesotho Furniture Manufacturers Ltd
Products: Pine furniture. The most modern furniture plant in Lesotho.

3 Zimbabwe

3.1 Adam Bede Furniture Ltd
Products: High class solid wood and upholstered furniture of reproduction type manufactured with modern methods and machinery. Exports.
Address: 9 Edison Crescent, Salisbury
Tel: 760198

3.2 Harlequin Furniture Manufacturers Ltd
Products: High class solid wood/upholstered furniture of reproduction type. Good use made of stained pinewood. Exports.
Address: P.O.Box 3809, Harare
Tel: 63495/6

3.3 J.W. Wilson Ltd
Products: Modern type of furniture hand carved with traditional design features. Exports.
Address: New Ardbeunie, Salisbury

3.4 KLEKO Ltd
Products: Pinewood kitchen furniture; pine batten boards, for export; pallets crating; prefab units of temporary type; etc.
Address: P.O.Box 2304, Salisbury
Tel: 760551

3.5 MIRCO Ltd
Products: Elaborate occasional type of furniture such as bar cabinets. Exports to the USA.
Address: P.O.Box 542, Bulawayo
Tel: 60242

3.6 Laminating Plant (Forestry Commission)
Products: Structural building components made of finger jointed and laminated pine. Output of over 6,000 m3 per year. Exports.
Address: P.O.Box 322, Mutare

3.7 Border Timbers Ltd
Products: Plywood, blockboard, batten doors, flush doors, blockboard shelving.
Address: P.O.Box 2037, Harare
Tel: 6781

3.8 Bakke Industries Ltd
Products: Mass-produced low-cost furniture in pine; crating; pallets; etc. Exports.

4 Swaziland

4.1 Swazi Pine Industries
Products: Pinewood chairs of "Captain type" mass-produced in a modern plant for export to Europe and Australia. Furniture is shipped individually packed in knock-down form, either unfinished or poliuretane-coated for glueing up by the customers themselves.
Address: P.O.Box 107, Kwaluseni
Tel: (0194) 84255/6/7

5 KENYA

5.1 Kist production Unit
Kimabu Institute of Science and Technology
Products: Standard furniture and joinery made entirely of pinewood in a recently established modern plant.
Address: P.O.Box 414, Kiambu
Tel. Karuri 22236

5.2 EHG Furniture and Prefab Factory
Products: It specializes in standard cypress furniture and prefab building units in pinewood.
Address: P.O.Box 18128, Nairobi
Tel. 20174

5.3 Timsales Co. Ltd. (Integrated Woodworking Enterprises)
Products: Sawnwood, plywood, hardboard (produced mainly from plymill and sawmill residues), blockboard, flush doors, window frames, chair components of moulded plywood.
Address: P.O.Box 18080, Nairobi
Tel. 559511
Telex. 24059 TIMSALES

5.4 Pal Plywood (Kenya) Ltd
Products: Plywood, particleboard, blockboard, flush doors and made-to- order furniture
Address: P.O.Box 241 Eldoret
Tel. 33811/2/3
Telex. 35093

6 Ethiopia

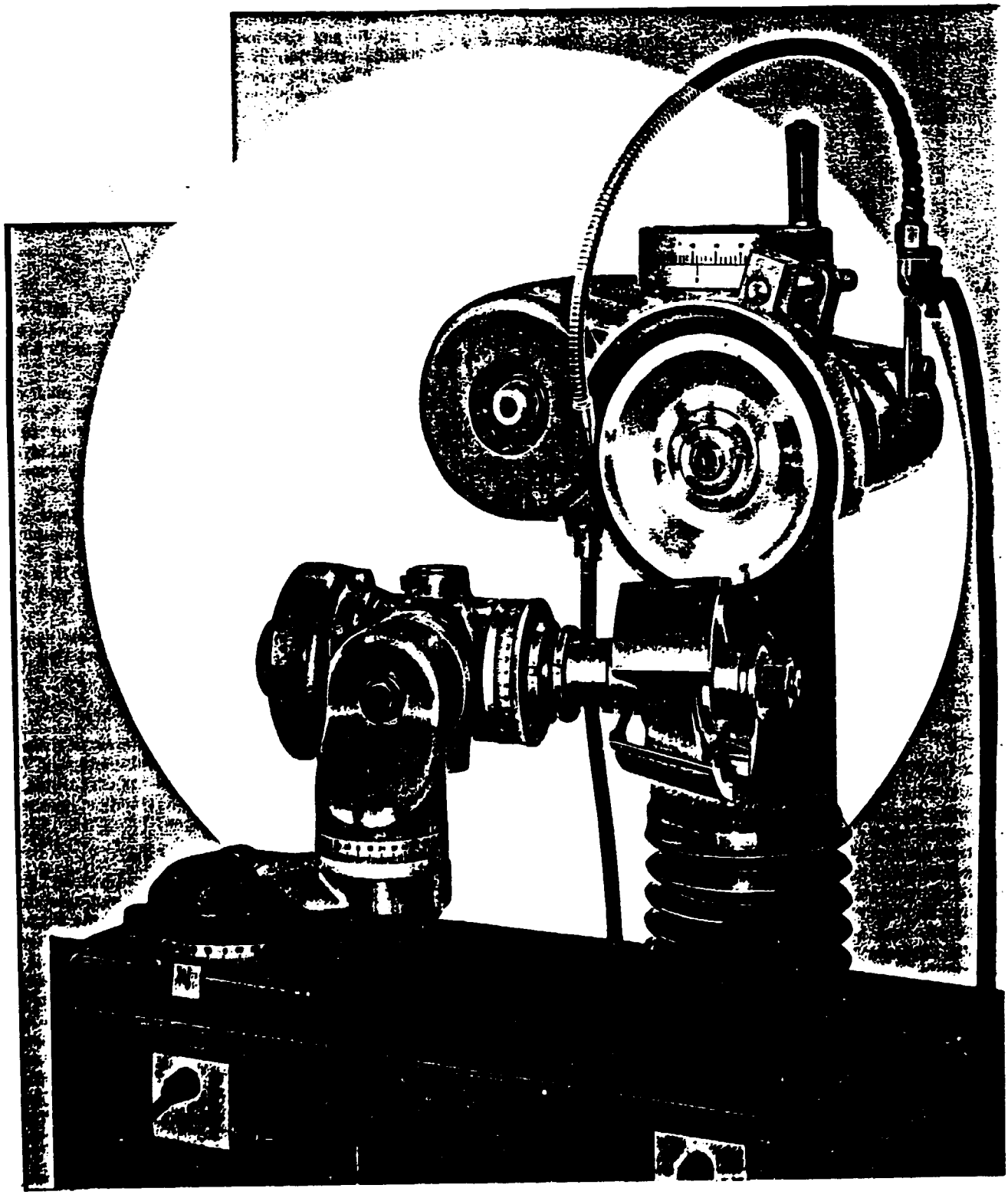
6.1 WABKA Furniture Plant
Products: Serial-produced modern furniture of Scandinavian type. Good range of equipment including a simple, very effective round-end tenoning attachment for spindle moulder. Good tool maintenance facilities
Address: P.O.Box 3086, Addis Ababa

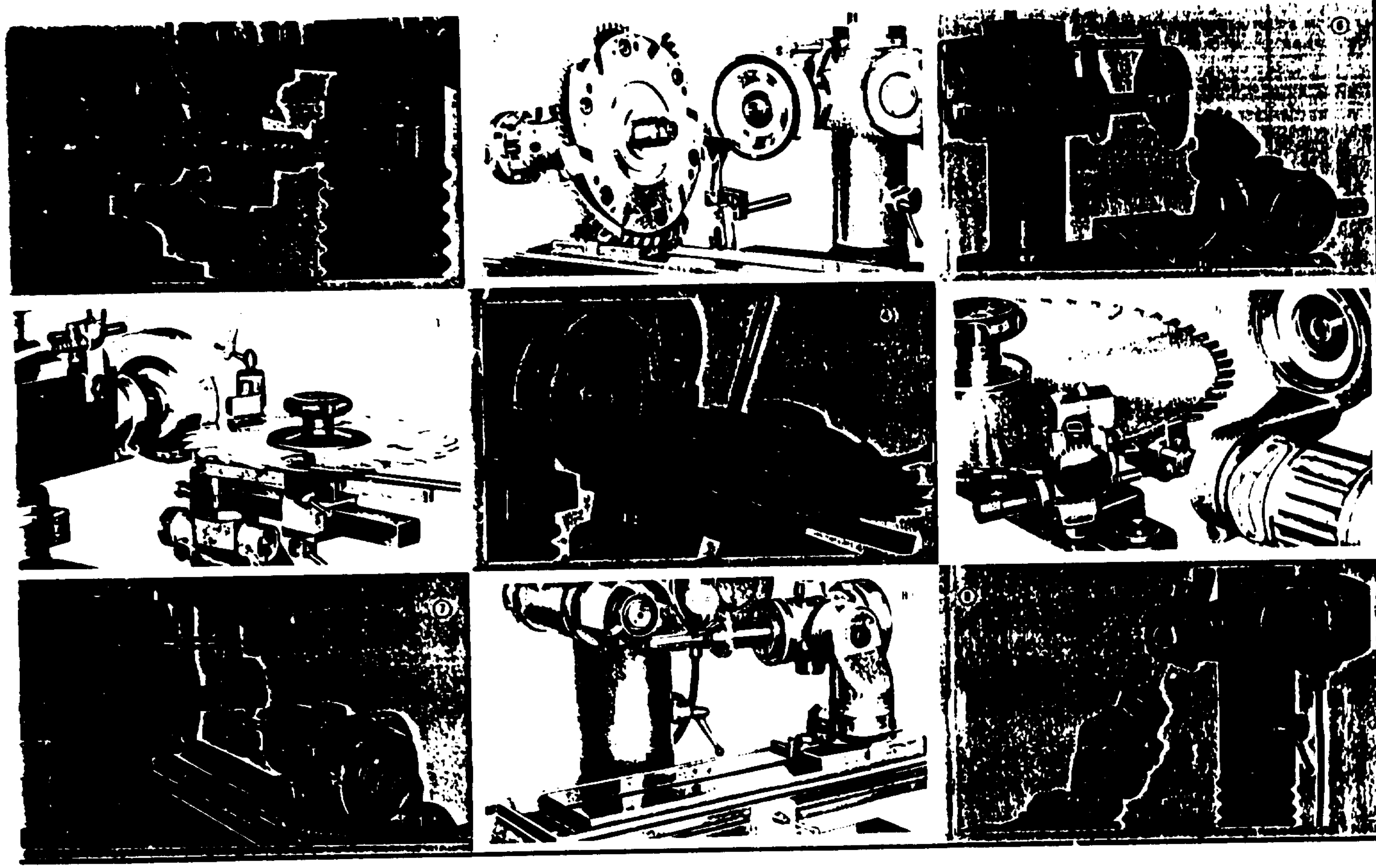
6.2 Ethiopian Chipwood and Furniture Co. (ECAFCO)
Products: Particleboard produced with eucalyptus raw material; prefab building units
Address: P.O.Box 2738, Addis Ababa
Tel: 160675, Telex ECAFCO 21060

6.3 ETHARSO company
Products: Fibreboard produced with eucalyptus raw material
Address: P.O.Box 5516, Addis Ababa
Tel: 201488

ANNEX VI

ILLUSTRATION OF TYPICAL UNIVERSAL GRINDING MACHINE SUITABLE FOR FURNITURE/JOINERY PLANTS





L'affilatura di utensili per la lavorazione meccanica del legno suoi derivati e materie plastiche e precisamente: ● Frese piane o sagomate in acciaio o con riporto HM (fig. 1) ● Dischi truciolatori per squadratrici (fig. 2) ● Seghe circolari con denti riportati HM piani (fig. 3 4) ● Seghe circolari con denti riportati HM a petto concavo (fig. 5) ● Coltelli piani per teste di scorniciatrici sia in acciaio che con riporto HM (fig. 6) ● Punte per pantografo (fig. 7 8) ● Punte per foratrice (fig. 9). Con la GRIFO U10N si può così inoltre provvedere alla affilatura e manutenzione di tutti gli utensili destinati alle macchine di produzione oggi maggiormente impiegate nella lavorazione industriale del legno (mobilifici, carpenterie, serramentifici, produzione di compensati truciolari, paniforti, ecc.) ● Fresatrici e scorniciatrici a più alberi ● Squadratrici automatiche ● Bordatrici e refilatrici ● Seghe multilame ● Foratrici multiple semplici e a telaio ● Pantografi copiatrici e cavettatrici ● Maschiettatrici per code di rondine ● Macchine per ricavare perni e spine

● HSS or tungsten carbide tipped cutters with straight face or relieving (1) ● Hogging units (2) ● Tungsten carbide tipped circular saw blades (3 4) ● Tungsten carbide tipped circular saw blade with hollow teeth (5) ● HSS and tungsten carbide tipped planer knives (6) ● Router cutters (7 8) ● Borers for automatic borer machines (9). With the GRIFO U10N you can grind any type of tools for machines used in the woodworking industries, tools service stations and large joinery and furniture works: ● Planing Squaring machines ● Automatic squaring machines ● Machines for heading and rectifying ● Circular multiblade saws ● Spindle moulders routers ● Dovetailing automatic machines ● Dowelling machines

● Fraises planes ou moulures en acier ou en HM rapportées (fig. 1) ● Disques de tronçonneuses pour équarrisseuse (fig. 2) ● Scies circulaires à dents rapportées en HM plane (fig. 3 4) ● Scies circulaires à dents rapportées en HM face concave (fig. 5) ● Couteaux plane pour têtes de moulureuses en acier ou en widia (fig. 6) ● Pointes pour pantograph (fig. 7 8) ● Pointes pour perceuses (fig. 9). Avec la GRIFO U10N on peu aussi affuter et effectuer la manutention des toutes les outils pour les machines qui sont la plus part employé pour le travail industriel du bois (fabriques de meubles, charpentier, fabriques des fermetures, production de contreplaqués, tronçonneuses etc.) ● Mortaiseuses et raboteuses à plusieures arbres ● Équarrisseuse automatique ● Plaqueuses de chants ● Scies multi-lames ● Perceuses multiples simples et à chassis ● Fraiseuses à copier ● Queues d'aronde ● Machines pour retirer pivots et tiges

● Profilfräsern aus Stahl oder mit hartmetallbestückten Zähnen (Zeichg. 1) ● Zerspaner Sammlungsfräsern (Zeichg. 2) ● Hartmetallbestückten Kreissageblättern mit Flachzahnen (Zeichg. 3 4) ● Hartmetallbestückten Kreissageblättern mit Muldenformigzahne (Zeichg. 5) ● Fräsern für Oberfräsern (Zeichg. 7 8) ● Hartmetallbestückten oder HSS Hobelmessern (Zeichg. 6) ● Bohren für Bohrmaschinen (Zeichg. 9). Mit unserer Universal-schleifmaschine GRIFO U10N kann man ausserdem alle zu den Produktionsmaschinen passenden Werkzeugen für die Holzindustrie (Möbelfabriken, Beschlagefabriken, Zimmerhandwerke, Sperrholz- und Spanprodukttionen) schleifen. ● Mehrspindlige Fräs und Einschneidemaschinen ● Automatische Kantenmaschinen ● Automatische Kantenumleimmaschinen ● Mehrblattkreissägen ● Automatische Bohrmaschinen und Langlochbohrmaschinen ● Zinkenfräsmaschinen ● Astlochbohrmaschinen Zapfenschneidmaschinen

CARATTERISTICHE TECNICHE

[illegible]

DONNES TECHNIQUES

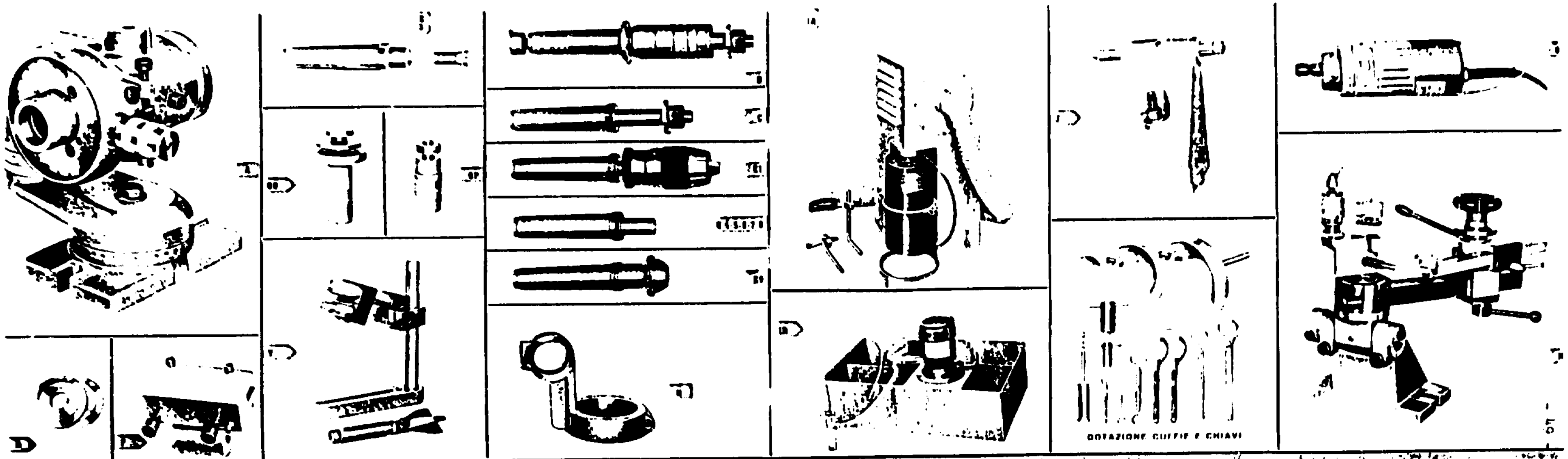
[illegible]

SPECIFICATIONS

[illegible]

TECHNISCHE DATEN

[illegible]



A = Divisore
J = Contropunta per detto
B = Mandrino portafresa lungo completo di distanziali, dado e rondella [illegible], vite e rondella bloccaggio cono, ghiera e [illegible]
C = Mandrino portafresa corto - nudo
D = Coppia bussole centraggio fresa (misura da precisare)
E1 = Mandrino portapunte tipo autoserrante per attacchi cilindrici da [illegible]
E3 = Mandrino portapunte completo di 5 pinze Ø 6 - 8 - 9,5 - 10 - 12
E4.5.6.7.8 = Mandrini fissi per punte ad attacco filettato (precisare la misura)
E9 = Mandrino fisso per punte con attacco conico per pantografo
F = Mazzetta portacoltelli lunghezza max mm 120 e 200
GG = Mandrino portamole grandi F 20
GP = Mandrino portamole piccole F 13
H1 = Apparecchio affilacircolari completo di carter raccoglipacce
I = Rondella centraggio foro circolari fino a Ø max 80 (precisare le misure)
K = Flangia centraggio foro circolari per fori Ø 70 - 80 - 90 e superiori (precisare la misura)
N = Collare speciale per applicazione elettrosmerigliatrice
O = Elettrosmerigliatrice giri 25000 per affilatura circolari con denti dalla parte concava
P - Q - R - S - T - U - V - W - X = Serie mole smeriglio e mole diamantate (descrizione particolareggiata sul listino)
Y = [illegible] portabatteria e portacomparatore
IA = Impianto di aspirazione con elettroventilatore a filtro e olio
IB = Impianto di refrigerazione con elettropompa

A = Diviseur
J = Contre poupée
B = Mandrin porte fraise long avec entretoises, écrou et rondelle de bout, vis de blocage et rondelle pour cône, bague d'extraction.
C = Mandrin porte fraise court, sans les pièces susdites
D = Douilles pour centrage des fraises, par couple
E 1 = Mandrin porte mèche type autoserrant pour queues cylindriques 3 - 10.
E 3 = Mandrins pour mèches à queue cylindrique Ø 6 - 8 - 9,5 - 10 - 12
E4 5 6 7 8 = Mandrins pour mèches à queue fileté (indiquer la grandeur du filet)
E9 = Mandrins pour mèches à queue conique pour machine à graver (cône Morse No. 2)
F = Porte couteaux jusqu'à 100 120 mm
GG = Mandrin porte meule grandes avec trous Ø 25
GP = Mandrin porte meule petites avec trous Ø 13
H1 = Appareil à affûter lames circulaires en métal dur, complet.
I = Rondelle pour centrage de trous jusqu'à 80 mm de Ø par pièce
IA = Installation d'aspiration
IB = Installation de refroidissement
K = Bride pour centrage de trous au delà 30 mm (70 80 90).
N = Collier pour monter l'appareil « O »
O = Appareil pour affûter les lames circulaires avants à arête concave
Y = Porte butées ou porte comparateur.
Butée complète de languettes
Comparateur pour lecture en centièmes

A = Indexing head
J = Tailstock
B = Long cutter arbor complete with spacers, nut and washer, tensioning screw and washer for receiving cone, withdrawal nut
C = Short cutter arbor - without accessories
D = Centering bush for cutters (dimensions to be stated)
E1 = Self locking drill collet for cylindrical shanks 3-10 mm
E3 = Collet for drills with cylindrical shank 6 - 8 - 9,5 - 10 - 12 mm
E4 5 6/7/8 = Collet for drills with threaded shank
E9 = Collet for cutter with cone shaft for engraving machine
F = Knife holder for knives of up to 120 mm
GG = Spindle extension for large grinding wheels
GP = Spindle extension for small grinding wheels
H1 = Attachment for grinding tungsten carbide tipped circular saw blades, complete.
I = Washers for centering bores up to 80 mm (specify size)
K = Flanges for centering bores of 70 - 80 - 90 mm (specify size)
N = Collar for mounting grinding attachment
O = Grinding attachment LESTO SCINTILLA GE USL 30 1 25.000 rpm for circular saw blades with hollow ground teeth
P - Q - R - S - T - U - V - W - X = 1 set normal and diamond grinding wheels (see separate price list)
Y = Support for tooth rest or dial gauge
IB = Extraction unit
IA = Coolant system

A = Teilapparat
J = Reitstock
B = Langer Fräsdorn komplett mit Distanzringen, Mutter und Unterlegscheibe, Spannschraube und Unterlegscheibe für Aufnahmekegel, Abziehmutter
C = Kurzer Fräsdorn - ohne Zusatzteile
D = Zentrierbüchse für Fräser (Masse angeben)
E1 = Selbstspannender Bohrerfutter für zylindrische Schäfte 3-10 mm
E3 = Bohrerfutter für Bohrer mit zylindrischem Schaft Ø 6 - 8 - 9,5 - 10 - 12
E4 5 6/7/8 = Bohrerfutter für Bohrer mit Gewindeschaft
E9 = Bohrerfutter für Bohrer mit konischem Schaft für Graviermaschine
F = Messerhalter für Messer bis max 120 mm
GG = Schleifdorn für grosse Schleifscheiben
GP = Schleifdorn für kleine Schleifscheiben
H1 = Schleifgerät für hartmetallbestückte Kreissägeblätter, kpl.
I = Zentrierscheiben für Löcher bis 80 mm Ø (Masse angeben)
K = Zentrierflanschen für Löcher Ø mm 70 - 80 - 90 (Masse angeben)
N = Mutter zur Befestigung der Schleifeinrichtung
O = Schleifeinrichtung 2500 U/Min für Kreissägeblätter mit hohler Zahnbrust
P - Q - R - S - T - U - V - W - X = Satz Schleif und Diamantscheiben (siehe getrennte Preisliste)
Y = Support für Anschlag oder Messuhr
IA = Kühlmittelanlage
IB = Absauganlage

ANNEX VII

FOREST PLANTATIONS IN MALAWI (1985)

Ownership		Area ('000 ha)
1.	Government	
	- Viphya Pulpwood Plantations	53.1
	- Timber Plantations	20.8
	- Research Plots	2.0
2.	Private and Local Authority Estates	15.6
	T o t a l	91.5

Source: Department of Forestry (Figures taken from the Statement of Development Policies 1987 - 1996 produced by the office of the President).

ILLUSTRATION OF HOLD-DOWN CLAMPING ACCESSORY WHICH SHOULD BE MOUNTED ON THE CLAMP CARRIERS IN USE AT THE WICO FURNITURE PLANT