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INTRAREGIONAL COOPERATION IN DEVELOPMENT
OF PLANTATION-BASED FOREST INDUSTRIES

DU/RAF/87/117

Technical report: An overview of the furniture and joinery industries in the following PTA countries: Burundi, Comoros, Djibouti, Ethiopia, Kenya, Malawi, Mauritius, Mozambique, Rwanda, Swaziland, Uganda, Zambia, Zimbabwe

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

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* This document has not been edited.
Stephen J Taylor. An overview of the furniture and forestry industries of the following PTA countries: Burundi, Comoros, Djibouti, Ethiopia, Kenya, Malawi, Mauritius, Mozambique, Rwanda, Swaziland, Uganda, Zambia and Zimbabwe, May 1991

This overview extracts from the individual surveys of these countries a summary of the secondary wood processing industry throughout the subregion, with respect to general market conditions, level of technology, product development and supply and utilization of plantation based materials. It indicates opportunities for increased exports and the obstacles needed to be overcome to achieve them. Attention is drawn to enterprises with expertise in particular areas of production and which could be transferable within the region. The overview also includes the suggested programme of technical assistance and 'eye-opener' seminars currently being proposed by UNIDO.
INTRODUCTION

1. TITLE OF MISSION: Overview of the secondary wood industries of surveyed PTA countries

2. MISSION EFFECTED BY: Stephen J Taylor
   Consultant in Secondary Wood Industries

3. PERIOD OF MISSION: May 1991

4. TITLE AND NUMBER OF PROJECT: Intra-Regional Co-operation in Development of Plantation-based Forest Industries - RAF/87/117 (UNDP-funded regional project)

5. EXECUTING AGENCY: Food and Agricultural Organization of the United Nations (FAO)

6. CO-OPERATING 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)
   Headquarters: Lusaka, Zambia

8. OBJECTIVES OF MISSION: Based on the surveys of the existing woodworking enterprises and assessments of the technical, managerial and commercial situation of these enterprises, to make recommendations on rationalization and development of the enterprises within the PTA context.
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CHAPTER I - SUMMARY AND CONCLUSIONS

1. Summary

Despite wide variations in area, climate, population, forest reserves and general economic development within the PTA countries surveyed, there are a number of problems common to the secondary wood products industry throughout the region. These problems may be grouped under the following headings:

- Materials
- Machinery
- Manpower
- Management
- External factors

There are several enterprises scattered throughout the PTA subregion which, by virtue of their organization and/or expertise in some aspect of furniture or joinery manufacture, set criteria for the remainder. These standard setters could, if willing, form the basis of a study-tour itinerary within the PTA subregion for a group of senior managers.

2. Conclusions

2.1 Materials

2.1.1 Inappropriately dimensioned and graded boards from the saw-mills lead to excessive raw material wastage in the secondary wood products industry.

2.1.2 Regularity of supply and consistency of quality of the timber supplied is problematical.

2.1.3 The importance of properly seasoned (kilned) timber in the manufactured product is not fully appreciated by either the saw-millers nor their customers.

2.1.4 The specific problems associated with the use of pine and eucalyptus in furniture manufacture, and the techniques to surmount them are not understood.

2.1.5 Because of lack of understanding and prejudice, little use is made of man-made panel material - particleboard, medium density fibreboard, plywood and hardboard.

2.1.6 Product design for "knock-down" or "knock-up"
products is difficult because the special fittings required have to be imported.

2.1.7 Many process materials - sanding belts, special adhesives and lacquers - as well as most upholstery fabrics and springing mediums, have to be imported from outside the subregion.

2.2 Machinery

2.2.1 Much equipment stands idle or is under-utilised for want of spare parts and/or process materials (see 2.1.7 above).

2.2.2 The absence of routine (preventive) maintenance leads to serious breakdowns.

2.2.3 Other equipment is idle either because it is too sophisticated and not understood or it cannot be economically loaded.

2.2.4 Limited technical understanding of the capabilities of precision (but basic) woodworking machinery leads to under-utilization of such equipment.

2.2.5 Little use is made of jigs and gauges to aid production and ensure consistency.

2.2.6 Industrial finishing processes (staining and lacquering) are basic (brushing rather even than spraying) and produce poor quality results.

2.2.7 Tool/cutter/saw sharpening and repair equipment and facilities in-company are inadequate and specialized service of this nature to the industry is rare.

2.2.8 Little use is made of basic materials handling devices and equipment with the consequence of not only higher handling costs, but also increased damage.
2.3 Manpower

2.3.1 There is a shortage of skilled wood-machinists - existing technical institutions tend to concentrate upon artisanal rather than production skills (see 2.2.4 above)

2.3.2 Production supervisors being ex-production operatives themselves, lack the skills they are expected to direct in their subordinates.

2.3.3 Skilled machine setters, tool and cutter grinders, saw-doctors are in short supply (see also 2.2.7 above).

2.3.4 Incentives to encourage skill-acquisition and bonus schemes to encourage productivity are generally absent.

2.2.5 Formalized, in-company training is non-existent.

2.4 Management

2.4.1 There is little professionally qualified management.

2.4.2 The basic organizational philosophy is that of 'made-to-order' manufacture with machinery regarded fundamentally as an aid to production rather than the basis of production.

2.4.3 Principles of production planning and control, quality control, cost analysis and control, work study, incentives, personnel selection and training are little understood.

2.4.4 Routine production management meetings are rare - meetings tend to be called on an ad hoc basis to tackle the current crisis.

2.4.5 Management performance tends to be re-active rather than pro-active.

2.4.6 Corporate plans and the detailed analysis required to produce them are absent.

2.4.7 Management in general tends to be weak in man-management (in disciplining and motivating) and, at junior level, reluctant decision makers.
2.5 External Factors

2.5.1 Shortage of foreign exchange is largely responsible for machines being idle for the want of (often) simple basic spare parts and/or process materials.

2.5.2 Import controls slow down the purchase of essential raw materials and fittings.

2.5.3 Tariff barriers inhibit intra-regional trade.

2.5.4 It is often easier to sell outside the region (to S Africa, Europe, USA) than within because of the bureaucratic controls.

2.5.5 Expansion and contraction of world trade and demand for primary products directly affects GNP and eventually demand for the output of the secondary wood industry.

2.5.6 The potential opportunities presented by population growth and increased urbanization are offset by the resulting tendency in the region towards lower per capita income.

2.5.7 Donor country assistance to the industry tends to be subject to their domestic policy changes which affect the frequency and amount of assistance.

2.5.8 Past restrictions on repatriation of dividends and capital have tended to discourage overseas investment in the industry.
CHAPTER II - SUMMARY OF AND RECOMMENDATIONS FOR ACTION

1. **Summary**

There are a number of actions that may be initiated within the context of this FAO/UNIDO project which will assist the secondary wood products industry in the PTA subregion to develop. Many are in the realm of training and education and all can be biased towards the increased use of plantation timber. The proposals are, for ease of presentation, classified into the same categories as in Chapter I.

2. **Recommendations**

2.1 **Materials**

2.1.1 Organize regional/national seminars/workshops for saw-millers and secondary wood products manufacturers to:

   a) Discuss timber standards, and
   b) Set up on-going consultative procedures to develop appropriate standards.

2.1.2 Arrange workshops to introduce modern construction technology in the use of man-made panel materials and knock-down/knock-up furniture fittings.

2.1.3 Disseminate information on the effective use of pine and eucalyptus (and cypress) plantation timber in the manufacture of furniture and joinery.

2.1.4 Investigate and establish which existing plantations and primary conversion operations are or are likely to become, commercially viable and direct available funds to them.

2.1.5 Provide specialist assistance to the rehabilitation of under-utilised particleboard manufacturing units where a feasibility study has established the prospects for financial viability over an acceptable term.
2.1.6 Investigate the prospects for setting up a large scale veneer production and veneered particleboard manufacture in the PTA subregion – Mozambique? Malawi? Tanzania?

2.1.7 Investigate the possibility of establishing (perhaps joint-enterprise?) manufacturing units to produce one or more of the basic process materials used in the industry eg sanding belts, lacquers, adhesives.

2.2 Machinery

2.2.1 Institute training programmes (initially regionally) to show supervisors, technical managers, general managers the capabilities of their existing machinery and combine this with the use of jigs and gauges.

2.2.2 Provide instruction on proper tool, cutter, saw maintenance and sharpening and the selection of suitable equipment for that purpose.

2.2.3 Provide lectures/seminars on routine machine maintenance procedure and collate existing knowledge into a handbook.

2.2.4 Assess the commercial viability of establishing a centralized tool/cutter maintenance service in each country’s main wood processing area.

2.2.5 Provide information and insights into modern industrial finishing techniques, equipment and materials.

2.2.6 Arrange national surveys of the machinery currently being operated in the industry with the aim of establishing what idle equipment can be reinstated and at what cost.

2.2.7 Carry out a feasibility study of the equipping of one or two heavy duty vehicles as mobile demonstration units of basic precision woodworking machinery and mobile lecture theatres to tour the principal furniture and joinery manufacturing areas to provide demonstrations and lectures by attached personnel.
2.2.8 Provide information on simple in-factory materials handling and transportation equipment and devices.

2.3 Manpower

2.3.1 Develop training programmes for technical institutions which will enable them to produce more skilled wood machinists.

2.3.2 Develop 'follow-up' courses to 2.3.1 for supervisory personnel to introduce them to basic man-management skills, production planning, cost and waste and quality control, materials handling etc.

2.3.3 Develop curricula for short courses in tool setting, grinding, saw doctoring.

2.3.4 Establish the curricula for a progressive range of certificates and diplomas in furniture manufacture and management.

2.3.5 Create a nucleus of work-study/production engineering consultants to service their national industry.

2.3.6 Develop appropriate incentive/bonus schemes for 'in-company' application.

2.3.7 Provide outline programmes for 'in-company' training.

2.4 Management

2.4.1 Provide introductory 'eye-opener' courses on modern manufacturing methods, planning, cost and quality control, work-study, product design and development (see Annex I).

2.4.2 Develop follow-up short courses of greater depth in, for example, production planning, cost control, budgeting.

2.4.3 Encourage the development of professionalism in the industry through the sponsorship by donor countries of academically suitable candidates to obtain appropriate degrees in overseas institutions, eg the BSc Furniture Production at Buckinghamshire College in the UK.
2.4.4 Initiate discussions on timber standards with the saw-millers (see 2.1.1 above).

2.4.5 Arrange PTA/national seminars on marketing and design, plantation-based materials, worker motivation, production incentives, in-company training and management development.

2.4.6 Arrange study tours of exemplary enterprises in the PTA subregion for selected senior managers (see Chapter III listing).

2.4.7 Provide examples and data on the successful use elsewhere of plantation timbers for furniture manufacture and its marketing.

2.5 **External Factors**

2.5.1 Encourage the current initiatives in the region directed towards the liberalisation of trade by the reduction of tariffs, simplification of documentation, the de-restriction of imports.

2.5.2 Encourage governments in the PTA to promote exports (particularly to hard-currency areas) by permitting the retention of an increasingly large proportion of foreign currency earnings.

2.5.3 Promote to donor countries the idea that funds devoted to providing technical and managerial training in regional-based institutions will be highly cost-effective.

2.5.4 Provide statistical analysis of the likely effect on national industry of the changes in population of urban growth and in forecasts of per capita income.

**CHAPTER III - LISTING OF EXEMPLARY ENTERPRISES**

Amongst the PTA countries surveyed there were a number of companies which stood out not only in general organizational/managerial terms, but were notable for an expertise in one or more specific areas of furniture/joinery manufacture. As such, if willing, they could collectively
provide practical illustrations of many of the desirable characteristics that a progressive enterprise ought to be demonstrating. They could therefore become the nucleus of a senior management study tour WITHIN THE PTA SUBREGION ITSELF!

Woodwork Ltd, Mbabane, Swaziland

PS — a company successfully processing eucalyptus to manufacture domestic and contract furniture of outstanding design. Exporting to S Africa.

Swazi Timber Products
Manzini, Swaziland

a company engaged in the large scale (mass) production of simple laminated pine products and exhibiting tight control over costs. All its output is exported to hard-currency areas.

International Timber Ltd
Blantyre, Malawi

— another company successfully manufacturing on a large scale laminated eucalyptus (for both its own use, and as supplier to other manufacturers). Also large producers of glulaminated beams and of plywood.

Furncoz Ltd
Ndola, Zambia

— a large company (500+ employees) producing in large batches, standardized products using accurately machined, interchangeable components manufactured from a wide range of materials — timber, steel, particleboard, plastic foam, upholstery covers, wire.
- 10 -

Wilgro Ltd
Harare, Zimbabwe

- a professionally managed, vertically integrated company using modern techniques to manufacture in large batches a wide range of quality products for the home and export markets. Possesses modern kilns and carving machines.

Economic Housing
Ltd, Nairobi, Kenya

- a well-managed company producing prefab houses of pine and furniture of cypress using also hardboard and plywood. It has introduced innovative designs and plans to expand into low-cost doors.
ANNEX I  PROGRAMME OF TECHNICAL ASSISTANCE AND 'OPEN HOUSE' SEMINARS ALREADY PREPARED IN THE INDIVIDUAL COUNTRY SURVEYS

OBJECTIVES

Objective 1

To provide a basic foundation for the rehabilitation of Zambia's existing production plant for the manufacture of panel based furniture and providing a decision making basis for the manufacture of panel based furniture in view of their potential PTA regional complementarity role.

Objective 2

To provide a basic foundation for:

(a) An increasingly relevant role on the part of Polytechnic and Technical Schools in Zambia 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.

Objective 3

To provide the necessary backup information on the potential of the PTA on the basis of a survey of the existing machinery and equipment available.

OUTPUTS

Output 1.1

To plant managers and production supervisors gain an appreciation of all critical aspects involved in industry in the production of standard furniture and joinery, towards increasing productivity, quality standards and overall operational efficiency. The areas of expanded knowledge include:

- selection of machinery; selection of cutting tools; interchangeability of parts and quality control; product costing; tool and machine maintenance; general techniques of surface staining and coating; plant layout; product design and production of panel based furniture - quality standard specification.

[Objective 1 and Activities 1.1 to 1.5 refer]

Output 2.1

(a) An increasingly relevant role on the part of Polytechnics and Technical Schools in Zambia 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.

Output 3.1

Produced reports with an appraisal of the constraints preventing the full utilization of the existing machinery at the plants surveyed. The reports are also to provide data and cost of corrective steps which are to be taken to rehabilitate the equipment which is not in operating condition.

[Activity 1.1 refers]

Output 1.2

Produced a pre feasibility study for setting up a typical self contained furniture manufacturing operation based on the type of panel line equipment available. The study will include:

- survey of general market conditions; definition of typical products to be produced; material input requirements; general factory building requirements; general auxiliary equipment needs; manpower requirements; general arrangement of financial viability; technical assistance requirements. [Activity 1.1 to 1.5 refer]

MAIN ACTIVITIES

Activity 1.1

To survey proposed host facilities in Kenya and Malawi in order to discuss seminar arrangements, prepare a tentative work programme and specifications of production supply items (such as quality control instruments, jigs, 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 of the Work Programme.

Activity 1.3

To conduct 2 General Seminars of two weeks each with 10 participants at each seminar in Malawi and Kenya.

Activity 2.1

Collect and review woodworking tool books dealing with industrial techniques, in use in Polytechnic and Technical Schools in the PTA.

Activity 2.2

Adaptation of existing UWIPA woodworking manuals and preparation of new ones, as required, to cover the topics in output 1.1.

Activity 1.1

To conduct a survey of the panel line machinery and provide a full inventory of the machinery and accessories available.

Activity 1.2

To collect and analyze the local data necessary for the preparation of a pre feasibility study.

Activity 1.3

To adapt, for the purpose of preparing a pre feasibility study, a typical panel based modular furniture system suitable for a wide range of rooms (wardrobe, bookcase, living room and dining room cabinets, etc.).

Activity 1.4

To prepare a typical pre feasibility study on the basis of the above.

Activity 1.5

To deliberate details of technical assistance required to start regular serial production of panel based furniture.
OBJECTIVE 4
To provide the basis for the improvement of tool maintenance methods at the Furniture and Joinery Industry in Zambia and in the other PTA countries in order to attain longer life of modern import machinery and quality improvement of machined parts, trained facility personnel in the use of machinery and related auxiliary plant tools.

OUTPUT

4.1 Three Project Profiles on the setting up of tool maintenance units within small- and medium-scale furniture/joinery plants, or as self-contained workshops for a two-year operation. Specifications of standard machinery, tools and equipment for a two-year operation. Specifications of storage arrangements for tools and equipment, training requirements, etc. (Activity 4.1 applies)

4.2 Trained 24 senior technicians in carrying out the maintenance of machinery using such processes as planing, sawing, moulding cutters, routing cutters, standard circular saw blades, carbide tipped circular saw blades, banded-hand reaming, 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 4.1, 4.2, 4.3, and 4.4 refer)

4.3 Extended utilization of the Project Profiles and Data Sheets made of their training courses for the benefit of the PTA furniture/joinery industry as a whole. (Activity 4.5 refers)

OBJECTIVE 5
To expand the capability of efficiently utilizing, in Zambia and in other PTA countries fast-growing plantation timber species (such as Pinus patula, Eucalyptus sp. and Cupressus limitalia) in the furniture and joinery industry as well as in building construction.

OUTPUT

5.1 Report on the use of Eucalyptus in the PTA and utilization for the production of furniture, joinery, structural building components and wood-based products. (Activities 5.1, 5.2, 5.3, and 5.4 refer)

5.2 Manual on standard wood treatment and wood preserving requirements of Eucalyptus, Pine and Cypress, to cover products such as kiln drying, cutting Joints, cutting-tool geometry with respect to both wood and metal cutting, choice of surfacing cutting material and methods, dipping process, blue stain and pressure-treatment of Pine, choice of adhesives for standard and joinery applications, choice and dimensioning of joints in chair manufacture. The report will also propose a set of minimum quality standards for furniture intended for use in the PTA and for government contracts. (Activities 5.4 and 5.5 refer)

5.3 Reference Manual on the design of standard roof trusses made of Plane and Cypress, including the design and fabrication of roof trusses made of Eucalyptus to be used in basketball training. (Activities 5.5 and 5.6 refer)

MAIN ACTIVITY

ACTIVITY 4.1
To survey the tool maintenance workshop of the Wares Furniture Factory and the WAREC Tool Maintenance Centre at Addis Ababa which, being representative in the PTA of the PTA equipped tool maintenance facilities for the furniture and joinery industry, qualify and select training Content. (Activity 4.1 applies)

ACTIVITY 4.2
To prepare specifications of supplies and accessories to be purchased for the purpose of conducting the training courses. (Activity 4.2 applies)

ACTIVITY 4.3
To prepare training data sheets and visual aids as a basis for conducting the maintenance courses. (Activity 4.3 applies)

ACTIVITY 4.4
To conduct 3 training courses on Tool Maintenance Technique of one month duration each for 6 PTA trainees on a time. (Activity 4.4 applies)

ACTIVITY 4.5
To prepare Project Profiles and Data Sheets prepared under the project. (Activity 4.5 applies)

ACTIVITY 4.6
To reproduce and distribute widely, in the secondary woodworking industry, the Project Profiles and Data Sheets prepared under the project. (Activity 4.6 applies)

ACTIVITY 5.1
To revise the experience gained by the International Timber Group in plantations, Malawi and PTA Woodwork PTV, Mthatha, 'iVstland, in the manufacture of furniture components, structural and building components made of laminated Eucalyptus. (Activity 5.1 applies)

ACTIVITY 5.2
To revise the experience gained by KBARDO and RBAGO in Addis Ababa, Ethiopia in the manufacture of fibreboard and particle board made of Eucalyptus. (Activity 5.2 applies)

ACTIVITY 5.3
To compile information on cardboard experience in the utilization of Eucalyptus in the primary and secondary wood processing industry. (Activity 5.3 applies)

ACTIVITY 5.4
To compile information from African and overseas research institutions, including Bureau of Standards, on wood processing 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 5.4 applies)

ACTIVITY 5.5
To 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 5.5 applies)

ACTIVITY 5.6
To reproduce the report and manuals under output 5.1, 5.2, and 5.3 for wide distribution in the industry, wood research institutions and ministries of works in the PTA.
### ANNEX I  PRELIMINARY OF TECHNICAL ASSISTANCE AND ‘OPEN GATHER’ SEMINAR ALREADY PROPOSED IN THE INDIVIDUAL COUNTRY SURVEY

#### OBJECTIVES

<table>
<thead>
<tr>
<th>Objective</th>
<th>OUTPUTS</th>
<th>MAIN ACTIVITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1</td>
<td>1. Influential forest products managers will better appreciate the value of the secondary wood products industry (and in satisfying the needs of the downstream industry).</td>
<td>Activity 6.1&lt;br&gt;Survey the sawmill industry in the PTA countries to identify participants who are able to articulate the problems of sad milling and production of both hardwood (and other appropriate) hardwood logs and prepared to listen to the needs of the sawmill industry.</td>
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<tr>
<td>6.2</td>
<td>2. Secondary wood products managers will be better able to design products to utilize more efficiently the higher quality and more suitable output of the sawmills. They will themselves better appreciate the benefits to themselves and the final consumers arising from the use of properly kilned timber.</td>
<td>Activity 6.2&lt;br&gt;Select from previously surveyed secondary wood products industry suitable managers able to articulate their material needs (in quality terms) and prepared to listen to and consider the problems of the sawmill.</td>
</tr>
<tr>
<td></td>
<td>3. General on-going dialogue between those involved in the sawmills and their customers (the downstream wood products industry).</td>
<td>Activity 6.3&lt;br&gt;Select suitable sawmill personnel trained personnel able to present technical information competently.</td>
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<tr>
<td></td>
<td></td>
<td>Activity 6.4&lt;br&gt;Conduct a prototype seminar of 10 participants in one of the PTA countries.</td>
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#### OBJECTIVE 6.1
To enable the sawmilling forest industries to become more aware of:

- a) The dimensional needs of the furniture/timber engineering industries in respect of solid timber, particle board, plywood, fibre board.
- b) The importance of appropriate and reliable quality grading.
- c) The critical importance of adequately kilned (seasoned) timber in furniture construction.
- d) An opportunity to obtain a higher price for some of its output.

#### OBJECTIVE 6.2
- a) To make the secondary wood products industry aware of the natural and physical constraints of the basic material that the mills have to process.
- b) To familiarize them with the advantages/.. disadvantages of using sawn grade.
- c) To re-emphasize the benefits derivable from the use of properly kilned (seasoned) timber.