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OF PLANTATION-BASED FOREST INDUSTRIES

DU/RAF/87/117

Technical report: The development of Swaziland'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 Stephen J. Taylor,
consultant, secondary wood industry

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* This document has not been edited.

ABSTRACT

Stephen J Taylor, The Development of Swaziland's Furniture and Joinery Industry in the PTA context, February 1991

The report reviews the status of Swaziland's secondary woodprocessing industry with respect of market conditions, level of technology, product development and supply and utilization of plantation-based materials, in cross-reference with the situation in the PTA subregion. It outlines opportunities for increased exports and for exchange of experience within the PTA. The report also provides terms of reference of proposed technical assistance activities to be undertaken at subregional and national level aimed at increasing the operative efficiency of the sector.

INTRODUCTION

1. TITLE OF MISSION: Survey of Swaziland's secondary wood industries in the PTA context
2. MISSION EFFECTED BY: Stephen J Taylor
Consultant in Secondary Wood Industries
3. PERIOD OF MISSION: 9 to 13 February 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 National 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:
 - a) To participate in a survey of existing secondary woodworking enterprises.
 - b) Assess technical, managerial and commercial situation of those enterprises within the PTA context.
 - c) To make recommendations on rationalisation and development of the enterprises (as appropriate)

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CHAPTER I - SUMMARY AND CONCLUSIONS

1 Summary

Swaziland is one of the smallest countries in Africa with a land area of just 17364 sq. kilometres and a population at the 1986 census of only 681,000 of whom 97% were Swazis. The government is committed to the encouragement of a free-market economy and this policy will, no doubt, have contributed to the fact that the country possesses one of the highest GNP per capita in the African continent.

Although not in an absolute sense large, the secondary wood products industry is, nevertheless, arguably one of the more developed in the P.T.A sub-region. The three major enterprises which were surveyed were all well equipped, well managed private concerns. Extensive use is made of plantation timbers (Pine and Eucalyptus) as well as a small quantity of European and African hardwoods. Man-made materials such as particle board (using plantation timber) plywood, hardboard and plastic laminates are also used in this wide ranging industry. The markets served range from the expensive domestic and commercial one (hotels, offices) through the middle price market to the very inexpensive mass produced d-i-y products for European super-stores.

2 Conclusions

2.1 Swaziland's secondary wood products industry is a well organised, commercially orientated, owner-managed one.

2.2 One enterprise uses exclusively plantation pine (from the Piggs Peak area), another consumes (virtually exclusively)

Eucalyptus, and the third both of these timbers and man-made materials. All use timbers kilned to a moisture content of 10-12% and all aim (and seem to achieve) a waste factor of only 10%.

- 2.3 All companies are basically machine-production orientated manufacturing in batches, standardised interchangeable components.
- 2.4 Each company is able to offer clients (for contract work) a comprehensive service from Design to Delivery.
- 2.5 A shortage of technical institution-trained skilled manpower could inhibit the industry's rapid expansion, but if that problem could be overcome (perhaps by more formal in-company training schemes) then the industry has the potential to increase its export earnings outside the P.T.A sub-region and, given suitable regional incentives, within the region.

CHAPTER II - FINDINGS

1 Demand and Supply of Furniture and Joinery and General Performance of this Sector of the Economy

1.1 The Present Situation

Swaziland is one of the smallest countries in Africa. Ethnically it is populated by Swazis (97%) with a balance made up principally of European stock. According to the 1986 census the population numbered 681,000 and predictions are suggesting a population of about 1M around year 2000.

Despite cash restrictions on the Swaziland Housing Board since 1988 (expected to be lifted soon) and effectively a static housing development since 1985, nevertheless, the projects in hand are expected to lead to a (necessary) upsurge in housing starts. This, combined with an expanding population in what is still expected to be one of the more wealthy (in per capita GNP) sub-Saharan states, indicates growth opportunity for the industry.

With an optimistic outlook, the industry is quite prepared to expand its activities to meet demand provided it can obtain the necessary skilled labour and develop its junior management.

The principal raw materials being used by the batch production industry are, Pine, Eucalyptus and man-made board (particle board, plywood, hardboard). Unlike some other African countries, there does not seem to be an in-built prejudice against either the use of, or consumption of Pine as a furniture material (see Annex I - Woodmasters Furniture Mfg. Co.).

1.2 Future Development

As indicated, the outlook for the industry is a good one given the urban population growth, the government policy on housing and on educational institutions and a continuing free-market policy stimulating outside investment in the country. The industry is well placed to respond to demand (subject only to the caveats already expressed of skilled labour shortages and the need for managerial training).

With its thoroughly modern, industrialised, approach to the manufacturing process, its very well equipped factories, its commercially minded senior management, the Swaziland industry is quite capable of "Leading the Way" in the development of the P.T.A furniture industry as a whole and of developing its exports within the sub-region (see 2 below).

2 External Trade in Wood Based Products

2.1 The Present Situation

Of the three principal enterprises surveyed, two are already very involved in exporting and to hard-currency areas rather than the P.T.A.

Swazi Timber Products (see Annex I) currently exports all of its very large output to the UK and other European countries and has its own sales organization based in the UK.' P S Woodwork Pty Ltd currently processes South African Eucalyptus and

' It consumes about 100 m³ of Pine per month at peak periods.

re-exports a percentage of its Danish designed furniture back to that country.

2.2 Future Development

Given appropriate incentives there is no reason why the industry should not export within the P.T.A area, though it must be remembered that with the existing connections to hard currency areas it will not be easy to persuade the companies to divert products to countries whose currencies remain controlled and not freely convertible. Another drawback so far as the P.T.A is concerned is that Swaziland has an excellent road network connected to South Africa and to the port of Durban whilst adjoining Mozambique is not only an unstable country politically, but its roads are generally in poor condition.

3 Review of Production Facilities

As has been indicated, the Swaziland industry is geared to batch production of standard products using interchangeable components. In addition it will undertake contracts for smaller batches of non-standard units eg. for housing contractors, hotel and office developers. As an industry it is generally well equipped with quite sophisticated wood-working machinery as well as the usual basic machines (see Annex I). In addition the companies surveyed are generally well equipped with machine and tool maintenance and sharpening facilities. In all companies there are design/draughting resources which are available for the development of clients' needs as well as for their own production requirements.

Quality control, although not a separated responsibility, does seem to be under effective control of a responsible workforce, adequately supervised, working to exacting standards specified on production drawings and documentation. None of the companies seen has its own kilning facility but all seem to be satisfied with the reliability of their suppliers in the matter of moisture content suitable for furniture manufacture.

There do not seem to be any exceptional financial problems within the industry and the government through its Swaziland Industrial Development Company (SIDC) (a joint venture with several major international financial institutions) is mobilising domestic and external resources to finance private sector projects throughout industry (and mining, agri-business, tourism etc).

It is clear that the Swaziland industry is firmly established along modern, commercially viable lines and to that extent could actually obtain maximum benefit in the very short run from a supervisory/management training programme of the sort indicated in Chapter III.

4 Product Design

The industry produces a wide range of well designed assembled and also knock-down self-assembly products (see Annex I). It has good design facilities which enables it to offer a complete package - from design to delivery - to prospective clients. Many of its current products would find good markets at all price levels in many P.T.A countries (though note, that unless furniture is designed as knock-down panel products, the

economics of transportation mitigates against long distance travel).

5 Timber Utilization

With minimal quantities of indigenous hardwoods, the industry would, for this type of material, be dependent on adjoining Mozambique once the latter country resolves its internal security problem. The other timbers used by the Swaziland industry are principally Pine (from Piggs Peak District) and Eucalyptus (imported from South Africa). Peak Timbers supply the Pine used at a moisture content of 10-12%, considered by the furniture industry as suitable for its products: although they have substantial plantations of Eucalyptus (Saligna) they have not yet managed to persuade the furniture industry to use their material. A seminar/workshop to which both foresters and furniture makers were invited could prove very useful to both parties in the understanding of each other's problems and in very real terms of establishing improved quality and dimensional standards.

6 The Development of the Secondary Wood Industry

As a well established industry its development will be along the lines of normal growth within the general context of world technological developments so long as it continues to have reasonable access to foreign exchange for new plant and equipment and spare parts and process materials. With a government actively encouraging industrial development (either for exporting purposes or with import-substitution objectives) then the

furniture industry ought in one or both of these ways be able to access the necessary currency to expand.

As a potential leader of the P.T.A region in terms of industrialized furniture production, Swaziland manufacturing has a very real possibility not only to export directly its products, but with suitable regional encouragement, perhaps to develop (jointly?) new companies within P.T.A countries using Swaziland's management skills and expertise.

7 Training

As has been indicated earlier, Swaziland industry recognises that, despite its quite advanced development compared with the corresponding industry in many other P.T.A countries, it could derive considerable benefit in the very short run from technical and managerial training courses as outlined in Chapter III and also from a seminar leading to closer collaboration with the plantation forestry industry.

CHAPTER III RECOMMENDED FOLLOW UP

OBJECTIVES	OUTPUTS	MAIN ACTIVITIES	INPUTS
<p>Objective 1</p> <p>To expand the manufacturing know how of an initial group of managerial staff in the furniture and joinery industry sector from Swaziland and the other PTA countries aimed at optimizing the benefits of industrialized wood processing.</p>	<p>Output 1.1</p> <p>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:</p> <p>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 specification. (Objective 1 and Activities 1.1 to 1.3 refer)</p>	<p>Activity 1.1</p> <p>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, jig accessories, special cutting tools, etc.) to be purchased under the project for seminar demonstration work.</p> <p>Activity 1.2</p> <p>To prepare terms of reference for the Lecturers and final Work Programme.</p> <p>Activity 1.3</p> <p>To conduct 2 General Seminars of two weeks each with 30 participants at each seminar in Malawi and Kenya.</p>	
<p>Objective 2</p> <p>To provide a basis for:</p> <p>(a) An increasingly relevant role on the part of Polytechnics and Technical Schools in Swaziland and the other PTA countries in stimulating a proper transition of the furniture and joinery sector from artisan methods to the industrial system; and</p> <p>(b) A permanent reference source on plant operation for the management of furniture and joinery plants.</p>	<p>Output 2.1</p> <p>Produce a set of Woodworking Training/Reference Manuals covering the main topics dealt with in Output 1 above. (Activities 2.1 and 2.2 refer)</p>	<p>Activity 2.1</p> <p>Collect and review woodworking text books dealing with industrial techniques, in use in Polytechnics and Technical Schools in the PTA.</p> <p>Activity 2.2</p> <p>Adaptation of existing UNICEE woodworking manuals and preparation of new ones, as required, to cover the topics in Output 1.1</p>	
<p>Objective 3</p> <p>To provide a decision making basis for the rehabilitation of Swaziland's existing production lines for the manufacture of panel based furniture in view of their potential PTA regional complementary role.</p>	<p>Output 3.1</p> <p>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 details and cost of corrective steps to be taken to rehabilitate the equipment which is not in operating condition. (Activity 3.1 refers)</p> <p>Output 3.2</p> <p>Produced a pro 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 ancillary equipment needs; manpower requirements; general assessment of financial viability; details of further technical assistance requirements. (Activities 3.1 to 3.5 refer)</p>	<p>Activity 3.1</p> <p>To conduct a survey of the panel line machinery and provide a full inventory of the machinery and accessories available.</p> <p>Activity 3.2</p> <p>To collect and analyze the local data necessary for the preparation of a pro feasibility study.</p> <p>Activity 3.3</p> <p>To adopt, for the purpose of preparing a pro feasibility study, a typical panel based modular furniture system suitable for a wide range of uses (wardrobes, bookcases, living room and dining room cabinets, etc.).</p> <p>Activity 3.4</p> <p>To prepare a typical pro feasibility study on the basis of the above.</p> <p>Activity 3.5</p> <p>To elaborate details of technical assistance required to start regular serial production of panel based furniture.</p>	

CHAPTER III - RECOMMENDED FOLLOW UP

OBJECTIVES	OUTPUTS	MAIN ACTIVITIES	INPUTS
<p>Objective 4</p> <p>To provide the basis for the improvement of tool maintenance methods of the furniture and joinery industry in Swaziland 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.</p>	<p>Output 4.1</p> <p>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 estimated cost of machinery, accessories and supplies for a two-year operation; specifications of storage arrangement for tools and supplies; lighting requirements, etc. (Activity 4.5 applies)</p> <p>Output 4.2</p> <p>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 circular saw blades, carbide tipped circular saw 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 4.1, 4.2, 4.3, and 4.4 refer)</p> <p>Output 4.3</p> <p>Extended 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 4.6 refers)</p>	<p>Activity 4.1</p> <p>To survey the tool maintenance workshop of the Warco Furniture Factory and the WUARC Tool Maintenance Centre of Addis Ababa which, being representative in the PTA of well-equipped tool maintenance facilities for the furniture and joinery industry qualify for hosting the Tool Maintenance Training Course.</p> <p>Activity 4.2</p> <p>To prepare specifications of supplies and accessories to be purchased for the purpose of conducting the training courses.</p> <p>Activity 4.3</p> <p>To prepare training Data Sheets and visual aids as a basis for conducting the maintenance courses.</p> <p>Activity 4.4</p> <p>To conduct 3 training courses on Tool Maintenance Techniques of one month duration each for 8 PTA trainees at a time.</p> <p>Activity 4.5</p> <p>To prepare Project Profile as a reference on the setting up of tool maintenance units.</p> <p>Activity 4.6</p> <p>To reproduce and distribute widely, in the secondary woodprocessing industry, the Project Profile and Data Sheets prepared under the project.</p>	
<p>Objective 5</p> <p>To expand the capability of efficiently utilizing, in Swaziland and in other PTA countries fast growing plantation timber species (such as Pinus patula, Eucalyptus spp and Cupressus lusitanica) in the furniture and joinery industry as well as in building construction.</p>	<p>Output 5.1</p> <p>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)</p> <p>Output 5.2</p> <p>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 preservative treatment of Pine; choice of adhesives for standard and structure 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)</p> <p>Output 5.3</p> <p>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 joints as practiced in Ethiopia. (Activities 5.5 and 5.6 refer)</p>	<p>Activity 5.1</p> <p>Review the experience gained by the International Timber Group in Blantyre, Malawi and P3 Woodwork PTY, Mbabane, Swaziland, in the manufacture of furniture components, joinery and structure building components made of laminated Eucalyptus.</p> <p>Activity 5.2</p> <p>Review the experience gained by ETHARGO and KCAFOT plants in Addis Ababa, Ethiopia in the manufacture of fibroboard and particle board made of Eucalyptus.</p> <p>Activity 5.3</p> <p>Compile information on overseas experience in the utilization of Eucalyptus in the primary and secondary wood processing industry.</p> <p>Activity 5.4</p> <p>Compile information from African and overseas research institutions, including Bureau of Standards, on woodprocessing requirements and durability and performance standards applicable to the use of Eucalyptus, Pine and Cypress in furniture and joinery production and structural building applications.</p> <p>Activity 5.5</p> <p>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.</p> <p>Activity 5.6</p> <p>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.</p>	

CHAPTER III - RECOMMENDED FOLLOW-UP

OBJECTIVES

OUTPUTS

MAIN ACTIVITIES

100/000

Objective 6.1

To enable the saw-milling 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 millers have to process.
- b) To familiarise them with the advantages/disadvantages of using man-made board.
- c) To re-emphasise the benefits derivable from the use of properly seasoned (kilned) timber.

Output 6.1

15 Influential forest products managers will better appreciate the needs of the secondary wood products industries (and in satisfying such needs be able to obtain a premium price for the material).

Output 6.2

15 Secondary wood products managers will be better able to design products to utilise more efficiently the better quality and more suitable output of the saw-millers. They will themselves better appreciate the benefits to themselves and the final consumers arising from the use of properly kilned timber.

Output 6.3

General an on-going dialogue between these producers (the saw-millers) and their consumers (the down-stream wood products industries).

Activity 6.1

Survey the saw-milling industries in the PTA countries to: select personnel able to be articulate on the process of selection and conversion of both softwood (and as appropriate) hardwood logs and prepared to listen to the needs of the down stream industries.

Activity 6.2

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 foresters.

Activity 6.3

Select suitable wood-science trained personnel able to present technical information comprehensively.

Activity 6.4

Conduct a prototype seminar of 30 participants in one of the PTA countries.

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ANNEX I

WOODMASTER FURNITURE MANUFACTURING CO (PTY) LTD
MBABANE
SWAZILAND

Mr Victor Irwin - Managing Director

This is a well established family business, manufacturing a wide range of standard products and contract furniture using a selection of timber based materials.

Products - Wooden domestic and office furniture, upholstery.

Markets - Swaziland government; retail; builders.

Production Processes Large batch production of machined interchangeable components assembled and finished to order.
-

Materials - Timber: Pine, Eucalyptus. (Swaziland Peak Timbers)
Particleboard: S African melaminated/veneered panels.
Plastic Laminate.

Timber Conversion Factor - 90%

Moisture Content - 10-12%

Machinery - A very wide range of both basic and advanced machinery. Fork lift and pallet trucks. There is a well equipped tool sharpening/machine maintenance workshop.

No of Employees - 65

Product Costing - Based on competition's prices. Simply use a figure of material cost multiplied by 3 to cover labour, overhead and profit.

Problems - Shortage of skilled tradesmen (the company carries out on-site installations). Would welcome training course for existing supervisors.

SWALI TIMBER PRODUCTS LTD
MANZINI
SWAZILAND

Mr Madhu Ramkolowan - Managing Director

A privately owned mass production manufacturing company producing a range of self-assembly products for the D.I.Y. (Do-It-Yourself) superstores in Europe.

Products - Shelving, wine racks.

Markets - Hard currency European (especially UK).

Production Processes
- Continuous production of interchangeable standard components, extensive use of jigs/gauges and numerically controlled machine setting.

Materials - Timber: Exclusively plantation Pine.

Timber Conversion Factor - 90%

Moisture Content - 10-12%

Machinery - A very wide range of advanced machinery (often in multiples) serviced by fork lift trucks, pallet trucks and roller conveyors (gravity and powered). A shrink-wrap package process is employed. There is a well equipped tool sharpening/machine maintenance workshop.

No of Employees - 250 working 2 shifts

Product Costing - Breakdown not available but manufacture is to very large contracts but, no doubt, with small margins per unit of output.

Problems - None, other than normal business ones.

P. S. WOODWORK PTY LTD
MBABANE
SWAZILAND

M Schnell - Chairperson

Originally established by a Danish aid agency, this privately owned enterprise manufactures very high quality furniture of Danish design in laminated Eucalyptus timber.

Products - Cabinet goods for domestic, office, hotel use. Upholstered show-wood furniture.

Production Processes - Batch production of machined interchangeable components finally assembled to order/contract. Use of jigs and gauges.

Material - Timbers: Mainly S African kilned Eucalyptus. Some Oak, Beech, Tambuti and Pine. Upholstery cover material imported.

Timber Conversion Factor - Target only 10% waste.

Moisture Content - 10-12%

Machinery - A good selection of basic wood-working machines of a high quality.

No of Employees - 71

Product Costing - Breakdown not available but (computerised) historical costs are analysed in order to produce a published price list.

Problems - None other than (apparently) an overloaded management needing additional assistance.

LIST OF PERSONS MET AND INSTITUTIONS VISITED

Mrs P P Dalamini	Assistant Planning Officer, Ministry of Commerce, Industry and Tourism, Mbabane
Mr Madhu Ramkolowan	Managing Director Swali Timber Products, Manzini
Mr Victor Irwin	Managing Director Woodmaster Furniture Co (Pty) Ltd Mbabane
Mrs M Schnell	Chairperson P S Woodwork (Pty) Ltd Mbabane