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18045

Distr.
LIMITED

ID/WG.500/2(SPEC.)
12 January 1990

United Nations Industrial Development Organization

ORIGINAL: ENGLISH

Global Preparatory Meeting for the
Second Consultation on the Wood and
Wood Products Industry*

Nairobi, Kenya, 24-27 April 1990

SECONDARY WOOD PROCESSING IN AFRICA

Background Paper**

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* Organized by UNIDO in co-operation with the United Nations Centre for Human Settlements (Habitat).

** The views expressed in this document are those of the author and do not necessarily reflect the views of the Secretariat of UNIDO. This document has not been edited.

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V.90-80323

ABSTRACT

This report presents an overview of secondary processing situations in the 17 African countries visited by consultants in connection with preparatory studies for the Second Consultation on the Wood and Wood Products Industries.

Conclusions and recommendations are concerned with strategies rather than individual, specific proposals; with economic, training and technological needs rather than the minutiae of particular single industry assistance.

Consideration is given to forest resource and useage only in the context of assessing present and future availability of wood inputs as raw material for the development of secondary processing industries.

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INTRODUCTION

The studies discussed cover the following countries:

Cameroon, Equatorial Guinea, Central African Republic, Gabon, Congo,
Report of Mr. B.A. Fultang, November 1989

Kenya, Tanzania, Malawi, Zambia, Zimbabwe, Madagascar, Swaziland, Ethiopia
Report of Mr. C.R. Francis, December 1989

Liberia, Cote d'Ivoire, Ghana, Nigeria
Report of Mr. G.E. Gresham, December 1989

The specific problems in the secondary processing sector of these countries are often very similar; need for training and training facilities to improve skills in wood machining and management; need for improved technology, better machines and methodology, reduction of waste and improved utilisation of materials and labour; need for product and market development, and access to development finance.

Resource

However the resource situation, the raw wood material supply is very different. A broad division would indicate that Central Africa has a total closed forest area of some 173 million ha containing some 35,000 million m3 of production forest out of a total of about 40,000 million m3 of growing stock. Plantation area is estimated at 235,000 ha of which more than two thirds is in Angola.

By contrast East Africa has a total closed forest area of only 9.2 million ha with about 4 million ha classed as productive containing 400 million m3. There is a total plantation area estimated at 650,000 ha mostly in Sudan, Kenya, Ethiopia (Malawi) and Swaziland. There is 66 million m3 growing stock of productive coniferous forest.

West Africa has about 11.3 million ha of productive forest out of a total closed forest area of 18 million ha. Growing stock is estimated as 2,900 million m3 of which roughly 2,000 million m3 is in operable forest. Total plantation area is about 330,000 ha of which 70 % is in Nigeria.

Source: UNIDO, First World Wide Study of the Wood and Wood Processing Industries, IS.398 August 1983.

Thus it can be seen that Central Africa tends to be resource rich with very little plantation activity, West Africa still has considerable natural resources, though fast diminishing, with patchy plantation activity, and East Africa has very small remaining natural forests, much more plantation activity and a substantial volume of coniferous species.

Strategies Related to Resource

The future development of the secondary processing sector depends to a large extent on the raw material inputs, which are and will be available, of course mainly lumber, but also panel products and other usually imported consumables.

Stages in development of the primary and secondary industries generally follow, rather than lead, resource constraints and are heavily influenced by population pressure on land use and fuelwood needs.

Generalising, the countries under consideration are therefore classified into three categories:

Table 1

Country	Annual Production		Annual Total	
	Saw/Veneer log m3		Roundwood Production	
	Non Con. m3	Conif. m3	Non Con. m3	Coniferous m3
GROUP 1				
Resource Rich				
Cameroon	2 million	-	12.4 million	-
CER	152,000	-	3.4 million	-
Gabon	1.3 million	-	3.8 million	-
Congo	700,000	-	2.6 million	-
GROUP 2				
Resource Moderate				
Cote d'Iv.	2.5 million	-	10.7 million	-
Liberia	800,000	-	3.6 million	-
Ghana	700,000	-	9.9 million	-
EQ Guinea	200,000	-	607,000	-
GROUP 3				
Resource Poor				
Nigeria	5.5 million	-	93.3 million	-
Madagascar	500,000	-	7.2 million	-
Ethiopia	120,000	18,000	36.0 million	2.7 million
Kenya	120,000	312,000	2.1 million	1.5 million
Tanzania	341,000	123,000	2.7 million	176,000
Malawi	48,000	23,000	6.8 million	36,000
Zambia	133,000	12,000	5.6 million	12,000
Zimbabwe	412,000	369,000	7.2 million	435,000
Swaziland	319,000	319,000	660,000	1.6 million

Sources: Consultant reports, FAO Yearbook 1987

The figures are rounded; the table is intended only to highlight that some resource poor countries are utilising huge volumes of roundwood in comparison with the much smaller volumes used for saw and veneer logs. The table also shows that the East African resource poor countries are utilising coniferous species, some of which is from plantations.

Generalisations to some extent may hide uses peculiar to a country e.g. Ethiopia uses a great deal of roundwood possibly 60 % plus as poles and posts in building construction where other countries would be using almost exclusively sawn lumber. Statistically it is estimated that in developing countries 20 % of roundwood, overall, is used in building construction.

Resource Management

In all countries the management of forest resource is important, the major necessity is to conserve by regulating the flow of timber used for fuelwood, industrial conversion and saw/veneer processing. Not all developing countries have been able fully to control rates of harvest for conversion and processing and none have control over use for fuelwood.

The control over the processing sector wood resource supply needs to follow closely the groupings above.

Group 1 countries still have the opportunity to regulate harvest volumes to the sustainable annual yield, without serious impairment or change of current economic activities, while building up their secondary wood industries.

In Group 2 countries regulations will need to curtail however especially of certain more popular species, they will need to restrict log exports and emphasize development of secondary processing and in particular concentrate on establishment and use of plantation wood.

Group 3 countries have little remaining productive natural growth to forest resources. Regulations are directed towards continued plantation establishment (including wood lots for fuelwood) and appropriate, economic uses of the already established plantation wood supply which now is or very shortly will become, the major input of raw material for the secondary processing industries.

As noted above, Central Africa has virtually no plantation wood resource, and from the table 1 the resource rich countries in Group 1 do not yet have an urgent need for a new resource.

The West Africa Group 2 countries are using up the natural forest very rapidly and have as yet not seriously established plantations for their future raw material and fuelwood needs.

Of the Group 3 countries, it is easy to see that e.g. Nigeria and Ethiopia with very large populations and almost no remaining natural forest are facing a current or imminent shortage of wood supplies for all purposes.

Wood Raw Materials

In the past, much of the emphasis and initiatives in secondary industries was only a spin off from "forestry". Hence there were forest industries, forest research, forest industry utilisation departments, forestry colleges and training establishments.

In the circumstances it is not surprising that with a few notable exceptions the secondary processing so far has received much less development assistance than strictly forest (silviculture) based issues and than even primary processing.

The position is now beginning to change with many governments recognising that secondary wood using industries belong within the industrial sector rather than in that of forestry.

What is being addressed is industrialisation of wood consuming industries, not development of forest industries. The distinction is important.

Having noted the resource base it is necessary briefly to examine the in-country supplies of wood material, sawn lumber, plywood and board products, the products of the primary production sector, available for present use and development of the secondary processing industries.

An overview of plantation supply development is given in Table 2. This shows that Tropical Africa falls well behind Tropical Asia and Tropical America in areas of plantations and a further statistic from UNIDO Study IS.398 (already mentioned on page 4) compares the annual rate of forest plantations with the rate of deforestation of the closed forest and shows that Tropical Africa has a replacement rate of only 1:10 compared with 1:4 for Tropical Asia. Tropical America is 1:8 but 1:3 if Brazil is excluded. The overall Tropical countries ration is 1:7.

Plantations

Table 2

1,000's of Hectares	Other than Fast		Fast		Total		Softwoods		All	
	Fast Growing Hardwoods Tot. 76-80	Hardwoods Tot. 76-80	Growing Hardwoods Tot. 76-80	Hardwoods Tot. 76-80	All Hardwoods Tot. 76-80	Hardwoods Tot. 76-80	Tot. 76-80	76-80	Tot. 76-80	Species 76-80
Tropical Africa										
37 countries	588	166	645	155	1233	319	547	147	1780	466
Tropical Asia										
16 countries	1976	626	2303	956	4279	1582	832	513	5111	2075
Tropical America										
23 countries	548	294	2451	1068	2999	1362	1621	688	4620	2050
Total of countries										
1,000s ha	3112	1086	5399	2179	8511	3263	3000	1348	11511	4611

Sources: FAO Forestry Paper 30, 1982

Once again, consideration of the three main Resource Groups will indicate a broad strategic pattern of present use and future trends. The Group 1 countries will generally consider solid wood products as capable of major development since they own large volumes of increasingly scarce prime hardwood timber species.

There are always exceptions to generalisations, one being Gabon which has a virtual monopoly on Moume (Anconea Klaineana), world renowned for its peeling qualities for manufacture of plywood. Nevertheless, these countries are likely to need expansion of their primary processing, particularly sawmilling - with associated kiln drying facilities to ensure adequate future supplies of lumber for developing their secondary industries.

The Group 2 countries have reasonably well developed primary processing and adequate supplies of lumber and plywood to support substantial increases in secondary processing. If log exports of prime species are curtailed or stopped, then the secondary sector could be assured of long term supply of prime hardwood for solid wood products.

If log exports continue in most cases there would be the need to assess the long term availability of plantation wood supplies and the time frame for a transition from existing timbers to a completely new scenario based on coniferous or fast growing hardwoods from plantations, or even the possibility of imports of lumber and plywood from resource rich countries within the region.

The Group 3 countries are already in the transitional phase or just about to enter it (Madagascar). With virtually no natural forest resource remaining it is of necessity processing plantation timber or soon will need to do so, and for secondary processing there is urgent necessity to train in and introduce new techniques using plantation wood and for greater use of panel (board) products with development of product lines based on these different raw materials.

Human Resource Development

Most countries are aware of the emerging role of industrialisation of secondary wood using enterprises in economic progress and creation of employment. The informal sector is already a very large 'employer' of labour though owner operated, one man or small joinery and furniture making enterprises.

Many countries have begun the planning of substantial moves into secondary wood processing. Ghana and other countries have already set up some industries, however the success rate is not high, with reports of the common under-utilisation of capacity, run down and broken down machinery and facilities, together with management and financial problems.

Much of the current difficulty is due to insufficient numbers of appropriately trained staff and workers. Future expansion in the sector must

rest on adequate numbers of trained personnel. A pool of trained labour is vital. In all industries there is a recognised rate of staff turnover so that, unless there are adequate numbers of trained workers, new and expanded enterprises tend to end up with more skilled jobs than there is trained labour to fill, with consequent high wastage and eventual failure.

On an industry wide basis it is also necessary to create a number of highly trained, versatile national technicians capable of a consultancy role to reinforce transfer of techniques and to demonstrate and train on the shop floor.

The use of appropriate trade associations or other NGO's is likely to be a key factor in provision of the consultancy servicing and general coordination of project training and other assistance to the industry.

The development of semi-skilled and skilled machinists is very much a hands-on process carried out on the shop floor by example and constant supervision to ensure safe and technically sound techniques.

Training of supervisors and managers/proprietors in more formal disciplines is necessary so that the workforce is able to be monitored and the working practices kept always up to consistent standards. The pool of national expertise will give assurance that standards are set, and met, and that technical assistance is always available industry wide.

While specific training facilities are needed, firstly to train the trainers and secondly to provide vocational training for e.g. much larger numbers of school leavers to form the future skilled labour force, a major priority is to facilitate on-the-job training for the existing workforce and for new intakes of extra unskilled staff which will occur as the secondary industries begin to expand. (See Training Schematic on page 12)

Many countries have already some vocational centres which could be developed, in others there are forestry utilisation and/or research departments, often under-funded and working under-capacity which could be adapted simply and at low cost to become effective training and technology transfer centres and to provide the on-the-job training for the industry.

Table 3

**TRAINING SCHEMATIC FOR WORKS AND MANAGEMENT
SECONDARY WOOD INDUSTRIES**

WORKS	ADMINISTRATION & MANAGEMENT
Level 1	
<hr/> Simple Use Single or Multipurpose Woodworking Machines	<hr/> Simple Machine Saw & Cutter Maintenance
Level 2	
<hr/> More Complex Use Variety of Single Purpose Machines and Jointing Techniques Use of Jigs	<hr/> Establishing Formal Saw/Cutter/Machine Maintenance Appreciation of Cost: Price Factor
Level 3	
<hr/> Line Use for Series Production <hr/>	
Component Manufacture to Consistant Standards by Line Production Utilising More Complex Single Purpose Machines - 4 Side Planers/Moulders, Sanders etc. - Spray Finish to High Standard	Production Management Business Skills Financial Appreciation Marketing & Design
Level 4	
<hr/> Full Scale Line Production Integration of Material Flows & Stock Fully Finished Furniture & Products to Constant Export Standard	<hr/> Full Business Management Cost & Budget Formulation and Control Personnel Skills Market & Product Development Design
Level 5	
<hr/> Factory Layout for Mass Production Sophisticated Machines & Material Flows	<hr/> Full Scale Formal Business Management & Control by Departmental Responsibility Financial & Market Strategic Planning to International Standards

It becomes increasingly vital to provide training for proprietors, entrepreneurs and management in sound business practice. As the size of an enterprise becomes larger the need for management training accelerates rapidly. The business 'complexity curve' rises very steeply as an enterprise expands, and if management is not able to receive commensurate training and advice the risk and rate of failure also rises, hence the failure or deteriorated state of so many primary and secondary woodworking industries in developing countries which have grown beyond the capability of the available management skills.

There appears to be a very distinct gap in the provision of appropriate training in business skills.

See Business Management Complexity Curve page 14.

Product and Market Development

The interaction between product development and marketing is seen often as the classic 'which comes first, the chicken or the egg' situation. Many reports recommend market studies when considering new enterprises or rehabilitating existing business.

In fact, product and market development are correlated and must be addressed concurrently.

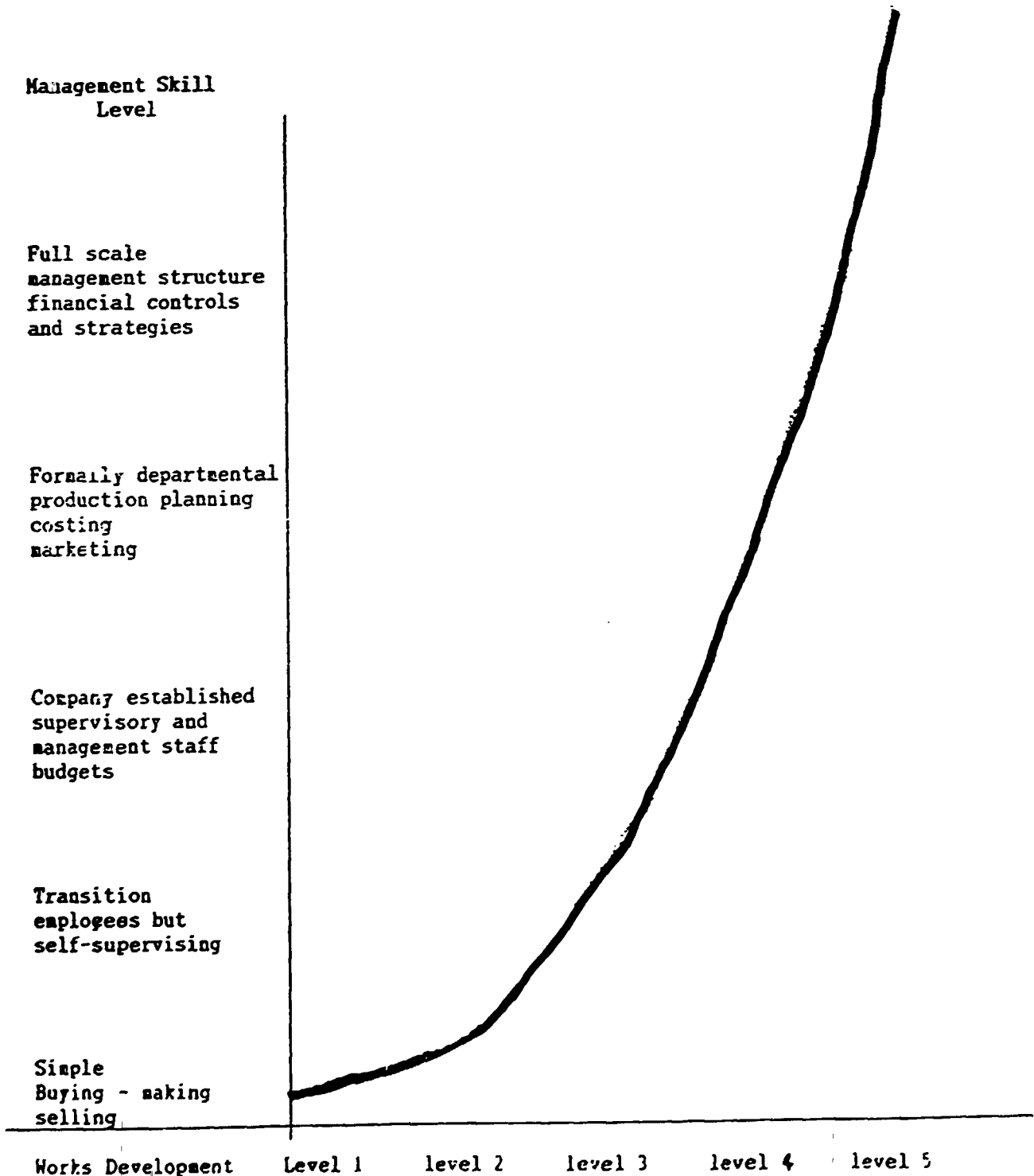
Markets exist somewhere for virtually every product, however before searching for the market it is essential to know what the product is going to be. This depends to some extent on the raw (timber) inputs but much more on the skill' and quality levels available.

Most secondary wood processors will advise that they can manufacture 'anything' or whatever the customer orders. They should first determine what they can make well, and at what quality and price levels. The organigram on page 17 presents visually in sequence some of the essential factors.

It can be seen that product potential is the primary consideration. Markets are there for consistent quality (at whatever level), competitively

Table 4

The Business Management Complexity Curve



priced products, whether e.g. furniture, blanks, semi-finished components or semi- or fully-finished assembles, but the first step is to assess the capability of meeting production criteria.

First can we make it, second can we sell it and make a profit.

If there is no profit potential then the sequence goes back to the start until product potential matches a market need.

A strong local market provides the best base for export development. Rejects and second qualities find ready acceptance on domestic markets while building up consistent quality for export. Mistakes sent overseas are very costly in money and in lost reputations.

Above all, buyers look for reliability.

In West and Central Africa there would appear to be a need to examine closely future potential for interregional trading in primary and secondary wood products. (See the Product and Market Development Sequence page 16)

Technology

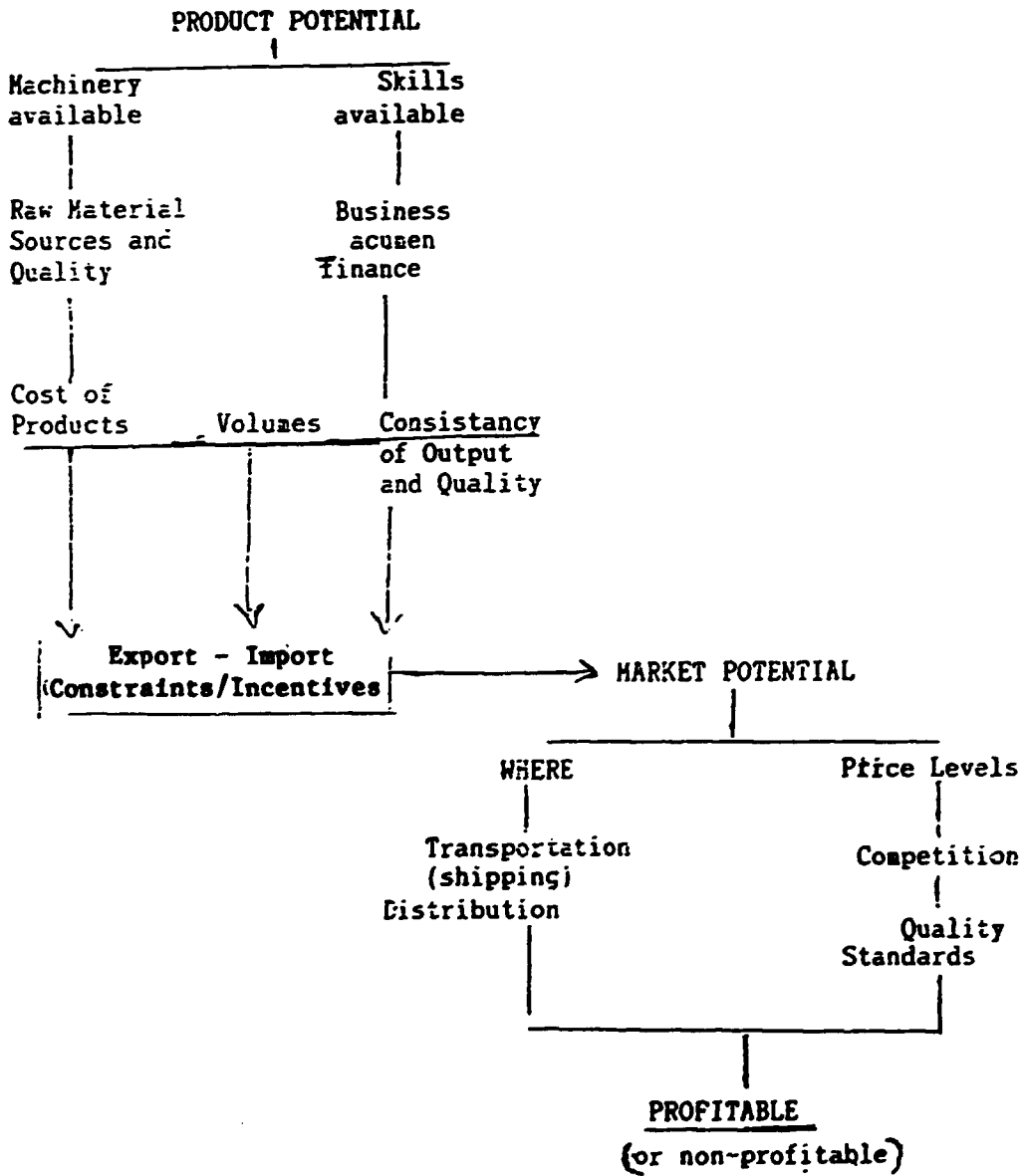
The technologies involved in secondary woodworking are well established. What is needed is the transfer of technique to management and workforce.

If anything, emphasis is required on finishing trades, sanding, final detailing and application of coatings. Even in the most sophisticated furniture factories in developed countries there is no substitute for the final hand finishing processes. In some developed countries there are problems not only of very high labour cost for these final stages, but often a shortage of workers willing to undertake this work at all.

Thus developing countries can have yet another significant advantage, given full attention to finishing processes.

-PRODUCT AND MARKET DEVELOPMENT

A SEQUENCE



As enterprises grow into full-scale manufacture there will be need for expertise in electronic controls which are now built into most modern machines. This type of installation may be some time in the future but the transfer of this technology should not be neglected.

Strategy

Only some existing SME's are capable or wish to expand and develop, though all can be helped to make a better product less wastefully and more profitably.

The steady build-up of formal skills, through young trained workers from the vocational and other training facilities, will eventually create a higher standard of workmanship.

The level at which existing or new businesses enter the formal woodworking sector as shown on tabel 4 on page 14 will depend on their current status; but there is no difference in the general strategy which must be followed - i.e. the efficient production of the chosen quality standard items at competitive prices. This requires also efficient trainers and competent management.

There is considerable mention of possible vertical integration of primary and secondary woodworking in developing countries. Possibly these notions are a hold-over from the time when all wood processing was seen as an extension of 'forestry'. In fact, there is little true vertical integration in developed countries and generally all industries have tended to de-centralize, de-conglomerate in recent years so that each business is run as a separate entity.

Vertical integration covers managerial and control problems and in the developing woodworking sector is unlikely to guarantee efficiency, adequate raw material supplies or elimination of waste.

The existence, say, of a large woodworking enterprise as a buyer of quality lumber should act as a stimulus to a number of sawmills to produce for its needs, and to sell to it smaller dimensions which might be unsaleable for construction or for export.

SUMMARY OF SOME COMMON FACTORS

1. **Formal formulation of economic strategy in the secondary sector**
2. **Forecasts of time and scale of change in primary processing from large tropical timber logs to small plantation wood**
3. **Evaluation of e.g. rubberwood conversion prospects as supplement to either domestic supply or log export product development**
4. **Greater promotion and use of lesser known species**
5. **Improved vocational and mature training establishments**
6. **Less wasteful primary and secondary processing and more use of waste**
7. **Substantial emphasis on seasoning of lumber for both domestic and export products by way of air seasoning, solar kilns and conventional kiln drying, possibly using wood waste as fuel**
8. **Forecasts of economics and financial considerations of Government and project strategies**
9. **Need for regular inter-country, interregional exchange of information on unit prices for logs, lumber and board products to ensure optimum price levels and prevent market fragmentation and manipulation.**

COUNTRY SUMMARIES

CAMEROON

Introduction

Cameroon is resource rich and produces around 2 million m³ p.a. of logs of which just over 60 % is primary processed in-country. The rest exported as logs. The primary processing is dominated by foreign controlled companies which have 70 % of concession areas, 80 % of all log production and 90 % of all exports. 75 % of the harvest is in only 4 species.

The local plywood and sawn wood production does not meet local consumption and some plywood (3,000 m³ p.a.) is imported from Gabon and sawn wood from CAR (volume unknown).

The secondary processing sector is largely informal, is not organised and production is not statistically accounted for. There are about 10 semi-industrialised joinery enterprises, one of these (SOFIBEL) is a joint venture with majority shareholding by the State. It operates a sawmill, plymill, a furniture and joinery workshop and has a drying kiln.

Some companies make wooden frame houses.

It is said the secondary sector capacity is under-utilised because of machine maintenance difficulties.

The National Centre for Forestry Development (CENDAFOR) is a public corporation responsible for forest industry and management and development of forest industries. It has a Wood Promotion Centre (CPB) with more than 50 machines and hopes to develop series production, furniture prototypes etc. with assistance from an ongoing UNIDO technical assistance project.

Strategy

Cameroon would appear to be well situated to expand and develop secondary processing.

There is sufficient resource.

There are already some larger and many SME's in the sector

The local demand is unsatisfied.

Prime targets for assistance would appear to be:

1. Programme of development for use of LKS within the country and for export
2. Creation of a Furniture and Joinery Manufacturers Association
3. Improve training facilities and create a pool of local expertise to assist existing and new SME's in rehabilitation and upgrading of standards towards eventual exports
4. Establish facilities for management training within the secondary wood using industries.

The development of the above priorities should assist in expediting several other proposals and recommendations contained in Mr. Fultang's report.

It would appear also that some development and rehabilitation in the primary sector for the nationally owned sawmills will be necessary to provide raw wood inputs for the secondary sector. In particular wood drying and seasoning is underdeveloped.

CENTRAL AFRICAN REPUBLIC

Introduction

CAR is relatively resource rich for its size and population but produce only a limited volume of logs, 182,000 m³ p.a., and over 90 % of this is just 3 species, Sapete, Utile and Obeche. There are six companies operating sawmills in the primary sector, two of them also with veneer/plywood mills. Production appears to be falling and mills operating under capacity. The industry is almost entirely in the control of expatriate enterprises. About 65 % of logs are converted within the country and around half the sawnwood is used locally. Sawnwood exports are made to Chad, Sudan and North Cameroon.

Strategy

As CAR is landlocked and transportation is a considerable problem, road and rail links will be key factors in developing primary and secondary wood industries.

Resource is available but primary industries are said to be run down and in need of improvement to ensure future supply for a larger secondary sector. Immediate needs would appear to be:

1. Form a Timber Industries Association to represent both primary and secondary sectors
2. Re-activate and rehabilitate AMEB and ONF workshops to provide training facilities and the establishment of a pool of trained national experts.

Other recommendations are contained in the report of Mr. Fultang.

GABON

Introduction

Gabon is a resource rich country but producing a relatively small log harvest of 1.3 million m³ p.a. of which about 35 % is milled within the country by some 12 sawmills producing only 40,000 m³ of sawnwood and 3 plymills manufacturing 65,000 m³ p.a. 86 % of the plywood production and 90 % of ply exports are owned by one company. Capacity is underutilised.

Secondary industries are not formally organised and consist mainly of small carpentry enterprises with minimum machinery. There are about 4 reasonably sized and properly equipped furniture and joinery manufacturers turning out good products, some equal to imported furniture. At least one, locally owned has a drying kiln.

Flush doors are manufactured by two of the companies.

So far, emphasis has been on development of primary processing, and on training in primary products - e.g. grading of logs and lumber courses organised by the African Timber Organisation (ATO) and financed by UNDP.

Strategy

With a major, unique resource so well known for manufacture of plywood (Okume), no doubt Government is assessing the future market opportunities for either expanding plywood manufacture for export or possibly export of dry or green veneer - since these are now banned in many countries the veneer demand/price equation may be more advantageous than for plywood.

For the secondary industries the needs might be:

1. Promotion of use of species other than Okume
2. Establishing training facilities for joiners and wood machining
3. A Government review of the wood industries sector to determine future policies and economic cost/benefit ratios for development of secondary (and primary) wood processing

CONGO (People's Republic of)

Introduction

Congo has a large forest resource with relatively low log production of around 700,000 m³ p.a. of which 58 % is controlled by expatriate companies and 21 % by joint ventures.

There are about 24 sawmills producing some 60,000 m³ p.a. of sawnwood of which roughly 35 % is exported. Again, the production is 82 % controlled by expatriate companies but capacity is said to be under-utilised. 4 companies produce about 50,000 m³ of veneers with one of them manufacturing 4 - 6,000 m³ of plywood p.a.

The "Office Congolaise de Forêts" (OCF) has successfully established a considerable plantation area, 4,851 ha in dense forest and the "Unité d'Afforestation Industrielle du Congo" (UAIC) has 23,559 ha of industrial plantations, mostly Eucalyptus and Pine which produces 170,000 tonnes p.a. of pulp wood and around 50,000 electricity and telephone poles p.a. for export.

The Ministries of Industries and Crafts, and of Trade, Small and Medium Size Enterprises both have interests in secondary wood processing.

There are three semi-industrialised enterprises in the joinery and furniture manufacturing sector and a very large number of small roadside workshops which are said to produce similar products at lower cost using workers trained on-the-job.

A training centre was established in 1970 through an FAO/UNDP project, now possibly being let to a private business which may continue availability of some teaching and practical demonstration on the still good woodworking machinery.

A UNDP/ILO project PRC/83/003 did assist in forming woodworking cooperatives. There has not been any follow-up.

In 1988 Congo imported "Furniture and other Beddings" to the value of Frs CFA 1,794,303,391 and FrsCFA 159 million worth of wood and wood products.

Strategy

As the cost of sawnwood is relatively high there are suggestions that secondary wood using industries should be sited close to primary processors. However this may cause problems of transport costs for the finished products. The secondary sector has had some attention in Congo however, the present situation, with substantial imports of products which could be made locally, requires an evaluation exercise on both primary and secondary processing to assess the cost/benefit economies of a substantial investment in medium, large-scale development, either by rehabilitating and enlarging existing enterprises or creating new ones, possibly by joint venture.

COTE D'IVOIRE

Introduction

Cote d'Ivoire has dramatically reduced log exports from over 3 million m3 in 1980 to around 600,000 m3 p.a. by 1987. Perhaps surprisingly the price paid in US\$ for export CDI logs in 1987 was below the 1980 price, as was the price of export plywood. The export price of sawn lumber in US\$ for 1987 was virtually identical with the 1980 price.

Production of sawn lumber has risen from 664,000 in 1980 to about 775,000 in 1987 with exports rising from 277,000 to a steady 460-470,000 p.a. in the same period. Production and exports of plywood are not much changed.

The Government plans to conserve prime species by imposing increased export taxes and other measures including log export bans and to develop the primary sector and the wood using industries. Further peeled and sliced veneer lines are proposed with major increase in manufacture of plywood.

Prepared developments in secondary processing (called tertiary in CDI) are proposed in joinery and furniture manufacture; to utilise a further 120,000 of sawn lumber in-country investment is intended to be all from the private sector.

Strategy

The intentions for increased processing are well set out in Ministry of Industry development plans. The proposed, substantial extra volumes of plywood would require careful market evaluation in order to meet heavy competition in volume and price from S.E. Asia producers. The proposals for secondary (tertiary in CDI) products will also have pre-requisites for niche market evaluations prior to commitments in specific production facilities.

In particular, in view of past export-price performance, financial forecasts, taking into account inflation, increased costs of spares and consumables and price expectations would appear to be an essential adjunct to product development plans.

The use of more species would warrant considerable emphasis.

LIBERIA

Introduction

Although Liberia has still a moderate resource remaining, the rate of use indicates a serious wood shortage in the medium term and log exports are currently rising, though prices through the years 1986-87 have remained static around US\$ 130 - 140 m3 after US\$ 176 - 180 in 1980/81. Sawn lumber exports have fallen but are beginning to recover in 1988-89 though mainly in one scarce species.

Plywood production is very small with no exports in 1986-87. A comprehensive report covering SME's in this sector is LIR/87/007 "Development of Small and Medium Scale Enterprises".

Strategy

Liberia has the basic infrastructure to develop secondary processing but this will require a substantial shift in Government policies and a very substantial programme of investment in training and provision of new manufacturing capacity.

1. There is domestic market potential on which to build up export quality standards and national SME's appear to have entrepreneurial abilities.
2. An overall economic-financial evaluation would assist in providing the Government with an overview forecast of the necessary pace and directions of investment.
3. Market studies and use of LKS are necessary.
4. Creation of the Trade Association LWCIA and development of training facilities are vital factors.

GHANA

Introduction

Ghana's log exports have been rising steadily since 1985, as have sawn lumber exports. Log prices in US\$ are lower than other countries in the region. Plywood production is very small.

Recently, emphasis has been placed on rehabilitating the primary and secondary industries and Ghana has a good base infrastructure with well established trade bodies capable of catalysing strong development in secondary processing.

Training facilities have not kept pace with this potential but there is already existing a sound furniture-making industry.

Strategy

1. Support for the Export Development Board and Furniture Producers Association
2. Establishment of woodworking machine training facilities and of management training is essential
3. Training of a pool of national experts in secondary wood processing would assist in transfer of technique and lead to improvement in production, less waste and product/market development
4. Use of LKS would assist in prolonging the remaining, only moderate volumes of natural species.

EQUATORIAL GUINEA

Introduction

Equatorial Guinea is a small country now producing about 200,000 m³ p.a. of logs, 33 % of which are converted locally in 7 sawmills, two of which also produce veneer.

Log exports were 129,778 m³ in 1987m sawn exports 12,351 m³ and veneer 11,351 m³.

The secondary processing sector is based generally on an extension of construction activity.

There are only a moderate resource and no training facilities for woodmachining or saw and cutter maintenance.

Strategy

1. Early consideration to establishment of plantation to supplement the natural timber resource
2. With already 13 concessionaires there should be no increase in number or annual harvest volumes
3. A study to determine appropriate training needs and the future pace and direction of secondary processing development
4. A programme of promotion of LKS for domestic and export markets.

NIGERIA

Introduction

Nigeria is a very large country heavily populated and with almost no productive natural forest remaining. Use of fuelwood is extremely high because of the high population and reports forecast impending wood shortages especially in larger urban areas.

Some plantations are established and further planting programmes are imminent. Nigeria imports sawnwood and plywood, local mills operate at about 50 % of capacity due to low productivity and shortage of logs.

The secondary processing sector also is working at less than 50 % of capacity, reasons stated to be low productivity, lack of spares and machine maintenance.

Strategy

1. Government should be encouraged to give priority to the wood industries sector, A project to produce an economic assessment would assist in determining how the processing industries are to be supplied with wood inputs in future.
2. Exports of secondary processed products would appear unlikely since there is such a huge domestic market. This market needs to be quantified.

MADAGASCAR

Introduction

Madagascar faces an imminent change from the indigenous quality hardwoods to plantation Pine and Eucalyptus. Most sawmills are small and of the 10 larger ones only 8 have modern equipment and are also integrated with joinery and furniture production.

The special requirements for Pine utilisation, with few exceptions, are little understood so that the bulk of the production is poorly presented, e.g. sap stained and untreated. Construction and other use techniques are unadapted from previous practices using hardwoods, therefore are inappropriate for Pine.

In the secondary sector there are several well equipped joinery factories but no serial production. Some furniture is exported to neighbouring countries. Most furniture is produced in solid wood and at artisanal level.

Strategy

1. Training in wood machining and for middle management is necessary, particularly in new techniques needed for processing and using Pine timbers and some Eucalypts.
2. Development of appropriate building codes for Pine construction, including use of preservations.

ETHIOPIA

Introduction

Ethiopia has a high population and is very short of timber for all uses. Fuelwood and building poles are of such importance that the Government has set up a Division of Wood Energy to distribute and market these products. The indigenous Podocamps and Junipers are still the bulk of sawlog supply however these resources are almost exhausted and there is already a severe shortage of sawn lumber. Eucalyptus from plantations established late last century form the major source of supply for fuelwood, building poles and the small fibreboard and particle board plants.

Pine plantations are insufficient to most future demands. Detailed projections and recommendations have been made by a Swedish Forestry Consulting Group.

The Wood Utilisation and Research Division (WUAR) of the Ministry of Agriculture operates a well established manufacturing, treating and drying plant with modern saw doctoring equipment suitable for training. This unit is largely self supporting through sales from an attached veneer slicing plant.

Strategy

Generally the wood industries in Ethiopia are in poor condition. Massive afforestation is required to provide a resource base. Only then will there be a basis for increase/improvement in sawmilling and processing facilities.

KENYA

Introduction

Kenya has a well established timber industry dating back to last century when sawmills were established to work the rich indigenous resource. Trade in mangrove poles to the Yemen and Arabian Gulf dates back several hundred years.

Production forests in Kenya are of five main types:

- Eucalyptus plantations**
- Softwood plantations**
- Indigenous rain forests**
- Mangroves**
- Wattle.**

The Eucalyptus plantations were originally established for railway fuelwood. They have continued to supply domestic fuelwood from coppice regrowth, also utility and building poles. Over the last 15 - 20 years planting of Eucalyptus has spread throughout the country to supply fuel for domestic use and for tobacco curing. This later planting is nearly all in small scale wood lots rather than large plantations.

Softwood plantations are mainly Cypress and Pine. There are several large, fairly modern sawmills, the newest only 10 years old, plus 20 - 30 small old mills which go in and out of production according to availability of logs. 69,000 m3 p.a. of panel products are manufactured and 21,000 m3 p.a. of plywood.

Many of the larger of several medium-sized furniture factories have connections with sawmills to give consistent raw material supply and produce good quality furniture in traditional and modern designs.

In addition there are some hundreds of small workshops producing joinery and furniture items.

A considerable use of wood is in the hand-craft sector, producing carvings for tourist souvenirs. No statistics of the considerable wood consumption in this industry are available but there is some shortage of suitable wood and seasoning is a problem.

Strategy

Kenya has a well ordered timber sector. Perhaps greater use of Pine in construction might benefit from the Kenya Bureau of Standards adopting or adapting a code of practice possibly derived from e.g. the Australian Light Framing Code.

TANZANIA

Introduction

The more accessible resources of indigenous hardwoods and softwoods have been cut off and supplies are consequently scarce and expensive.

Tanzania has considerable resources of plantation wood, 72,230 ha of hardwoods, 65,170 ha of softwoods. Hardwoods are mostly Eucalyptus mainly 12 years old and softwoods Cypress and Pine mainly 12 - 30 years. These are located in areas rather far from the major centre of use, Dar-es-Salaam.

The timber industries are nationalised and owned by Tanzania Wood Industries Corporation (TWICO); main production is in 8 sawmills, two plywood mills and a particle board plant. Timber is generally in good supply.

The industry is therefore well established though working under capacity due to spares and maintenance difficulties.

Strategy

1. There is potential to export lumber to adjoining countries such as Burundi, Rwanda, Kenya and Uganda, however import duties up to 50 % in some countries are an inhibiting factor.
2. Need for training for improvement of marketing techniques and product development, linked with training in Government-to-Government negotiations on tariffs and interregional trade.

MALAWI

Introduction

Malawi has a large area of plantations. 71,000 ha of softwoods (Pine) and 13,800 ha of hardwoods which are still being planted at about 450 ha p.a.

The major plantation area is remote from the main centres of wood use. The industry is owned and operated by the Government Wood Industries Corporation (WICO).

As there is a shortage of fuelwood from indigenous timber sources a Department of Wood Energy has been established to make and distribute charcoal from the plantation wood. The Department has also designed a very fuel efficient brazier which is so successful that demand outstrips supply.

There are some small private mills and a medium-sized sawmill/plywood operation using mainly Eucalyptus from its own plantation, and also making glue laminated beams for export to South Africa.

Furniture and joinery workshops are in the Blantyre-Limba area.

Strategy

1. The Government Wood Utilisation and Research Department is understaffed and under-equipped to carry out necessary work on strength and preservation testing and there is also need for introduction of lumber grading rules for the plantation species.

2. Establishment of grading rules would assist in possible export development.

ZAMBIA

Introduction

Zambia has 18,200 ha of hardwood plantations mainly Eucalyptus and 32,000 ha of softwood (Pine). These, and the dependent industries are controlled by the Government Zambia Forest and Forest Industries Corporation (ZAFFICO) which operates a number of mobile sawmills and two large modern sawmills in the copper belt area.

Some indigenous hardwood timbers are converted by pit sawyers which serve the small and artisanal level of furniture and joinery enterprises.

There is a privately-owned particle board mill, producing for export and domestic demand, which has a sawmill, D.I.Y. component and furniture factory producing good quality for export to Europe.

Strategy

1. Future expertise is being sought in furniture design and manufacturing techniques.
2. There may be potential for manufacture of timber preservation chemicals, such as CCA, or a less toxic, more 'natural' preservative.
3. Local manufacture of some types of builders hardware would be worth evaluation.

ZIMBABWE

Introduction

Zimbabwe has 69,000 ha of Pine plantations and 32,000 ha of hardwood (Eucalyptus), two thirds of which belong to private owners and one third owned by Government.

Forest industries are progressive and technically competent but there are severe difficulties in obtaining foreign exchange for much needed spares, leading to many stoppages in sawmills and the plywood plant.

A large proportion of the pine lumber is kiln dried but again there is lost time and capacity due to frequent breakdown.

There is a pulp and paper mill, a particle board plant and a substantial saw and knife maintenance facility.

Strategy

The Zimbabwe timber industry is capable of developing the quality, range and efficiency of its wood products, however shortage of foreign exchange for spares and new equipment is the major inhibiting factor.

The loss of efficiency caused by lack of spares is an undoubted cost to the economy of the country. An evaluation of the cost/benefit ratios may show that measured release of foreign exchange for specific rehabilitation of machinery will in fact produce significant economic gains.

SWAZILAND

Introduction

Swaziland has never had a large area of national forest. Plantation of softwood 74,731 ha (mostly Pine) and hardwood 26,791 ha (mostly Eucalyptus) are larger than the natural forest.

The plantations support major export, timber-based industries, pulp and paper, sawn lumber, mining timber poles and furniture. These products, mostly sold to South Africa, are a high percentage of total export earnings, 24 % by 1978.

Facilities are modern, well equipped and maintained. Quality is high with strict quality control. Operators have training courses available in South Africa.

Furniture products from several, well equipped factories are exported to South Africa.

Conclusions

There are no marketing difficulties and the Swaziland timber based industries are flourishing, limited only by availability of wood supply.

Table 5

DATA Bases Adjusted 1987

	Total Veneer/Saw wood incl. conifer.	All Species Roundwood Total incl. conifer.	Estimated Productive Forest Area	Population
CAMEROON	2.0 million	12.4 million	22.5 million	10.0 million
CER	152,000	3.4 "	20.0 "	2.5 "
GABON	1.3 million	3.8 "	22.0 "	1.2. "
CONGO	700,000	2.6 "	14.0 "	1.8 "
COTE D'IV.	2.5 million	10.7 "	3.3 "	10.1 "
LIBERIA	800,000	3.6 "	3.8 "	2.3 "
GHANA	700,000	9.9 "	2.8 "	14.0 "
EQ. GUINEA	200,000	607,000	1.0 "	0.35 "
NIGERIA	5.5 million	93.3 million	4.3 "	102.0 "
MADAGASCAR	500,000	7.2 "	13.0 "	10.6 "
ETHIOPIA	120,000	40.0 "	5.0 "	43.5 "
KENYA	423,000	22.8 "	2.6 "	21.2 "
TANZANIA	341,000	23.9 "	23.9 "	23.0 "
MALAWI	48,000	6.9 "	0.5* "	7.9 "
ZAMBIA	133,000	5.6 "	6.5* "	7.3 "
ZIMBABWE	412,000	7.6 "	0.7* "	9.1 "
SWAZILAND	319,000	2.2 "	0.1* "	0.7 "

*FAO MISC 88/7 - Baseline 1980