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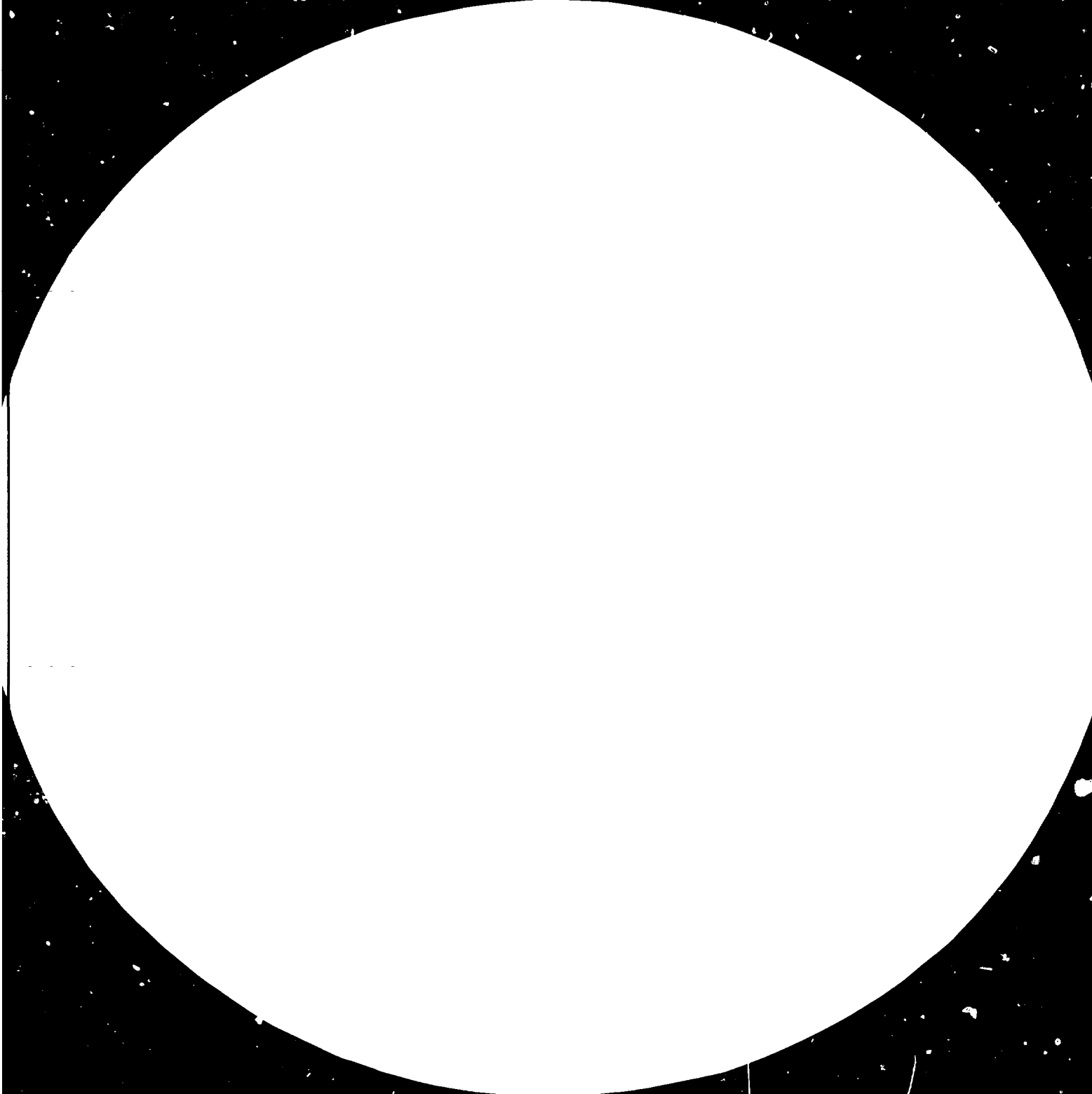
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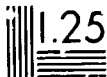
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Resolution test target 1.0, 1.1, 1.25, 1.4, 1.6, 1.8, 2.0, 2.2, 2.5, 2.8, 3.2, 3.6, 4.0

Resolution test target 1.0, 1.1, 1.25, 1.4, 1.6, 1.8, 2.0, 2.2, 2.5, 2.8, 3.2, 3.6, 4.0



10270



Distr.
LIMITED
ID/WG. 320/17
11 February 1981
ENGLISH

United Nations Industrial Development Organization

Technical Course on Criteria for the
Selection of Woodworking Machines

Milan, Italy, 5 - 21 May 1980

STATUS OF THE WOOD PROCESSING INDUSTRIES IN GUYANA *

by

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1. Present Situation of the Woodworking Industries

1.1 Importance of this Section

The woodworking industries in Guyana consist of sawmill and secondary wood products manufacturing. In the primary sector, there are no plywood, particle board or any such plants producing panel products, and in the secondary sector manufacturing is confined mainly to furniture, joinery and wooden ware. There is also one factory making prefabricated buildings and building components. The intermediate sector consists of planing mills which are usually attached to sawmills, and these manufacture lumber profiles for the building industry. There are no lumber concentration yards, dimension stock plants, wood turning or furniture component factories.

All of the raw material needs for the above sectors are obtained from the country's 70,000 square miles of hardwood forests. In spite of this rich resource, the forests of Guyana play a minor role in the economy of the country. One species, Greenheart (*Ocotea Rodiaei*) accounts for about 60 per cent in volume of the species removed from the forests. Expansion of the forest industries is therefore largely dependent upon the increased utilization for particular end uses of all worthwhile species of the 1000 which are known to occur.

1.2 Production and Trade

Statistics on production and employment for the years 1971 - 1978 are available only for sawmills as indicated in Table 1. The Guyana Timber Export Board is the sole agency responsible for the export of wood (and wood products) from Guyana. Secondary wood products may be exported outside of the Board but foreign trade of this type is negligible. The exports through the Board consist mainly of Greenheart in the form of sawn squares for marine construction, piling and hewn squares for markets in Europe and the

United States of America; and Wallaba (Eperua Faleata) transmission poles, posts and sawn shingles for the Caribbean. Table 2 shows the volume of timber exported through the Guyana Timber Export Board for the period 1970 - 1979. A significant secondary wood product exported to the Caribbean during this period but not through the Board is that of prefabricated wooden buildings.

Table 1
Production for Sawn Wood for the Years 1971 - 1978

Year	Quantity of wood Cons-med in cubic feet Hoppus (i)	Equivalent volume in f.b.m. of lumber	Number of persons employed (ii)
1971	5,908,100	35,448,600	Not Available
1972	6,166,500	36,999,000	2,689
1973	6,554,700	39,328,200	3,083
1974	7,411,381	44,468,286	2,863
1975	7,653,708	45,922,248	2,682
1976	7,360,704	44,164,224	2,943
1977	6,123,051	36,738,306	3,748
1978	5,844,785	35,068,710	Not Available

Note: (i) These figures are based on those supplies by the industry.

(ii) These figures are rough estimated only and are not bases on a census.

Source: Forest Department Reports.

Table 2

Export Performance 1970 - 1979

		Forest Production in 000'm ³	Export Volume 000'm ³	Average Export Vol/year 000'm ³	Export Value G\$ Million	Average Percent Growth per year
	1970	232	27.40)		2,449)	
Pre GTEB	71	213	30.90)	33.60	3,149)	20.8
Establish- ment	72	222	42.50)		3,765)	
	73				4,300)	

	1974	249	41.69)		5,400)	
Post GTEB	75	220	40.47)		8,264)	
Establish- ment	76	214	35.44)		9,547)	
	77	198	35.59)	40.28	9,096)	24.1
	78	198	37.56)		10,918)	
	79	198	50.95)		14,400)	

Source 1: Forest Department Annual Report 1977 - 1979 estimated Forestry Commission.

Source 2: 1970 - 1972 Statistics Office, 1974 - 1979 GTEB Records.

A recent and increasing export wood product is that of round logs. While it is appreciated that there is need to increase the value of the country's wood exports by exporting lumber and wood products other than logs, it is felt in certain quarters that the prospect of gaining acceptance of the lesser known wood species of Guyana might best be served by selling them initially in log form to markets which are prepared to pioneer their utilization.

The effect of this will not result in lowering the present level of wood processing in the country but might further affect the expansion of the industry by reducing the potential raw material supply for species suitable for veneer, plywood, furniture and other secondary wood products manufacturing. The significance of this is important since the writer feels that one of the most serious constraints to the improvement and expansion of the industry in Guyana has been the lack of an assured supply of raw material at various stages of processing for the needs of the industry's sectors other than sawmilling.

1.3 Incentive for Industrialization

In February 1979, the Government issued the "Guyana Investment Code". In this Code the Government recognizes a trisectoral economy, that is, an economy composed of the Public Sector, the Co-operative Sector and the Private Sector. Preferred areas for Private and Co-operative Sector activity to which greatest encouragement will be given including the following.

- (a) Manufacturing and activities based on indigenous resources thereby promoting the maximum use of domestic raw materials.
- (b) Manufacturing and other activities utilizing or developing appropriate or domestic technology.
- (c) Manufacturing and other activities geared to strengthen export drives.

- (d) Manufacturing and other activities geared to produce inputs for other locally based economic activities.
- (e) Manufacturing and other activities promoting development in non-urban areas.

The Government recognizes the need for a single Investment Act dealing with fiscal and other incentives, and the following areas will receive special attention:

- (a) Special incentives for industries geared for export.
- (b) Special incentives for industries of a non-extractive nature.
- (c) Special incentives for industries established in priority development regions of the country.
- (d) Special incentives for industries which impact significantly on special areas of economic significance, that is, employment.
- (e) Special incentives for industries which significantly develop appropriate or resuscitate relevant local technology.

The Code makes specific reference to Private Sector Forestry activities in that the State will continue to support by means of incentives and financial assistance, local private investment in the forest sector including sawmilling and logging. Emphasis will be placed on the processing of forestry products and encouragement given to enterprises which move into the secondary stages of processing.

Among other preferred manufacturing activities, the Code identifies the following which may be of particular interest to Woodworking Machinery Manufacturers, namely "Activities which manufacture spare parts and components or inputs for industrial or other use".

With regard to investment with foreign participation the Code defines the following permissible patterns of ownership:

- (a) The foreign investor alone.
- (b) The foreign investor and individual(s), companies or corporations of the national private sector.
- (c) The foreign investor and co-operatives.
- (d) The foreign investor and the State.
- (e) The foreign investor, individual(s), companies or corporations of the national private sector and co-operatives.
- (f) The foreign investor, co-operatives and the State.
- (g) The foreign investor, co-operatives, individuals(s), companies or corporations of the national private sector and the State.

If, however, the foreign investor is a foreign government or the official arm of a foreign government, the only permissible patterns are those including the State.

1.4 Problems facing the Industry

In order to appreciate the problems facing the wood processing industry in Guyana today, it is necessary to understand both the historical and current development constraints which hindered the industry thus far.

Historical Development Constraints

- (a) The extractive exploitation of the forest resources without the replacement of inputs which contribute to the permanent establishment, development and expansion of the industry in the various regions of the country.

- (b) A system of forestry education and hence practice over-biased in favour of the conservation of the forests and not towards their utilization.
- (c) The failure of the nation's forest managers to realize that they are an essential part of the forest industry and not just its conservators or revenue collectors.
- (d) The concentration on the export of forest produce primarily of one species (Greenheart) in log and baulk sizes.
- (e) The non-development of processing operations such as veneer, plywood and blockboard manufacture.
- (f) The absence of these intermediate raw materials to provide a base for a viable secondary manufacturing sector.
- (g) The reliance on the fulfilment of the industry's research and development needs on the laboratories of the developed countries; the patterning of local wood research along lines which are geared to determine how the indigenous species measure up to those from outside the region, rather than trying to develop new uses for indigenous species or new ways of meeting traditional needs.
- (h) The procurement of machinery and equipment from limited sources and the failure to conduct research and to develop machinery and equipment suitable to the needs and conditions of the industry in Guyana.
- (i) The failure to utilize the forests for the establishment and development of forest based communities or for rural development of the area by practising a policy of internal colonialism.
- (j) The failure of trained woodworking personnel to find employment in the industry because of the absence of a vigorous secondary manufacturing sector or to create self-employment opportunities for themselves.

- (k) A preference for large-scale enterprises (which have not yet been established) as against small scale ones (which have not been properly established). Large scale industry requires large sums of capital to finance their establishment and large volumes of a limited variety of wood species for their two and three shift operations. Guyana has had neither of these requirements in plentiful supply.

Small scale industry on the other hand is less demanding on raw materials and capital and is more flexible to meet limited market needs for specialist products which are suitable to the nature and availability of Guyana's hardwoods.

- (l) Absence of a positive investment policy and attitude to the importance of the forest and wood processing industry sector

Current Development Constraints

Some of the historical reasons which have been responsible for the under and inefficient utilization of the forest resource and the underdevelopment of the wood processing industries in Guyana continue to exist to some extent but the main problems are organizational and are as follows:

- (a) The absence of a Forest Industry Development Policy.

This is not a Forest Policy which deals more with the role to be played by forest management in providing a forest resource for use by man (and attempts to define in a limited way what the forests may or should be used for).

A Forest Industry Development Policy should go further than this and define in more detail the ways in which the current generation's share of the forest resource should be utilized, the means by which the forest produce should be converted into useful products and the manner in which it should be made available to all who need it.

The Policy will for example define:

- (a) How the country could and should provide for its forest resource needs in terms of its species/need/ volume, availability at required points in time.
- (b) For what purpose or to what uses should the available resource be put.
- (c) How should the different species be used.
- (d) What quantities of each type of resource should be allotted for each purpose or product category.
- (e) What level of technology might best be used for each category of industry.
- (f) Should the industry be labour or capital intensive.
- (g) Of what size or sizes should the manufacturing units of each industry category be.
- (h) Under what system of ownership should each industry category or enterprise operate.
- (i) How best should the forest produce be made available for use to each category of industry.

2. The Absence of a Forest Industry Development Programme

Once the policy has been determined the key to the expansion and improvement of the wood processing industry in Guyana is the preparation of a wood industry development programme. Integration is what is needed in the industry and the programme is the base for achieving such integration.

Integration will effect co-ordination among the various sectors and interest groups of the industry which will need to be structured in such a way so that each sector or group will be dependent upon another for support of some kind. The sectors and groups are the owners and/or managers of the forest resource, the primary processors,

intermediate processors, intermediate manufacturers and organizations and institutions which are responsible for promoting and regulating these activities. The programme will promote and control wood industries development and improvement through projects which are part of the needed integrated structure.

The programme will provide information on how to structure or re-structure the industry to achieve the integration desired.

3. The shortage of technical and managerial expertise both for operating the industry and for improving and expanding it.

The industry itself is not sufficiently developed or shown promise of development to attract suitably qualified technical and managerial personnel, nor to encourage persons from within the country to become thus qualified. Furthermore, neither has it been able to fully provide job satisfaction and opportunities for advancement, nor to fully retain the services of those personnel who are qualified to make a contribution towards the development of the industry.

4. The absence of an assured raw material base for expanded primary and secondary manufacturing sectors of the industry.

An abundance of raw material for particular end uses exists, but it is unavailable to the industry in sufficient quantities, partly because of causes due to development and forest policy attitudes, because of problems concerning their procurement, manufacture and marketing, and because of a lack of co-ordination among these various activities and industry sectors throughout the country.

2. Timbers

- 2.1 The Forest Resource

Guyana's forests extend over an area of 70,000 square miles, each of which may contain as many as 100 to 200 different species out of an approximate 1000 species. Individual species or a species display dominance within the forest types which are mostly

medium to high density hardwoods. There are no indigenous softwoods and plantation forests are limited to experimental plots of the latter.

All productive forests are owned by the State and are controlled by the Forestry Commission through the issue of Timber Sales Agreements for the removal of forest produce.

2.2 Furniture and Joinery Timbers

Guyana does not have an abundance of wood of species suitable for furniture and joinery manufacture in the interpretation of traditional property requirements for such end uses. Furniture species are usually of low to medium density, fine texture, of good drying characteristics with low shrinkage values, good machining and sanding properties, ability to be stained to the desired colour where necessary, good gluing and finishing properties, and of a pleasing decorative appearance - a feature which is determined by customer acceptance according to tradition in particular market areas. In addition to this, furniture woods are usually required in very large quantities to satisfy the market needs for what is in vogue and the consequential high output of the furniture factories to meet such needs.

Because of the lack of such specie requirements, furniture in Guyana is made from the medium to high density species of decorative appearance and fine, medium and even coarse texture. Drying and gluing characteristics are usually ignored as well as the problems which may exist in machining, sanding and finishing operations when it comes to selecting species for local furniture manufacture.

The low density woods are selected for use in joinery manufacture. Selection criteria includes ease of working resistance to splitting and dimensional stability especially for use as windows.

Table 3 lists local woods which are used locally or are considered suitable for furniture and joinery manufacture.

No sawn lumber is imported into Guyana. Present importation of panel products consists of Virola plywood from Suriname.

Table 3

Species used locally for Furniture and Joinery Manufacture

LOCAL NAMES	BOTANICAL NAMES	LOCAL NAMES	BOTANICAL NAMES
1. Crabwood	Carapa quianensis	13. Kabuballi	Loxopterygium sagotii
2. Purpleheart	Peltogyne spp.	14. Manniballi	Moronobea caccinea
3. Kereti	Ocotea spp.	15. Cedar White	Tabebuia insignis var
4. Tauroniro	Humiria balsamifera	16. Wamara	Swartzia leiocalycina
5. Dukalli	Parahancornia amapa	17. Pekuri	Platonia insignis
6. Tatabu	Diploctropis purpurea	18. Duka	Tapirira marchandii
7. Simarupa	Simaruba amara	19. Manni	Symphonia glovulifera
8. Balli	Virola surinamensis	20. Cedar, Red	Cederla odorata
9. Locust	Hymenaea spp.	21. Fukadi	Terminalia spp.
10. Shibadan	Aspidosperma spp.	22. Determa	Ocotea rubra
11. Silverballi brown and yellow	Aniba and Licaria spp.	23. Dukaliballi	Brosimum
12. Kurokai	Protium decandrum	24. Aromata	Clathrotropis spp.

2.3 Seasoning of Timber

Guyana Timbers Limited and Guyana Forest Industries Corporation, both State-owned enterprises, are the only plants which season

timber on a commercial scale using both kilns and air seasoning methods. The former company, Guyana Timbers Ltd. seasons lumber primarily for the building industry, while the latter seasons a small amount of furniture species.

Traditional air drying methods dry 1 inch thick lumber to approximately 14 percent in 6 months for the high density species and 4 months for the low density species. Both companies use low temperature kilns for drying accumulated volumes of small quantities of a variety of species for the building and secondary manufacturing industries. The drying time by this process takes approximately three weeks to produce wood at about 18 per cent moisture content.

2.4 Problems

The primary problems of the local woods are concerned with the following:

- (a) Availability in the species, quantity, dimensions, moisture content and quality to suit the needs of the various manufacturing sectors.
- (b) Technological problems such as difficulties in conversion due to high density and tendency to spring. Machining problems such as tear-out in grain. Tendency to split. Seasoning problems such as twisting, cupping and checking. Resistance particularly of sapwood to insect attack.
- (c) Marketing problems such as the acceptance in new markets of the lesser known species particularly for construction, where traditionally softwoods are being used.

3. Primary Wood Processing Industries

3.1 Importance of this Sector

Primary wood processing consists of sawmilling and as mentioned earlier, there are no factories manufacturing wood based panels. As a result, the sawmilling industry is very important in Guyana

because it provides all the wood raw materials require for direct use by the building industry and the raw material base for the secondary wood processing industries.

The sawmilling industry has not shown much growth over the past ten years. The total number varies between 70 and 80 mills which vary in size from small circular mills employing about 10 persons to the large band mills employing almost 500 persons including those engaged in log extraction, transportation, sales and services. The average annual production during the period 1971 - 1978 was 34,779,696 f.b.m. Table 2 shows the annual production for each year and number of persons employed in this sector of the industry.

3.2 Range of Products Manufactured

The sawmills produce sawn wood products for the local market consisting of lumber, scantling and beam sizes for construction since most of the houses in Guyana are built of wood. Very little wood is sawn specifically for the furniture and joinery industries. Other sawn products include railway croo-ties, lumber for boat building, bridges, marine work, soft drink boxes, concrete shuttering, etc.

Sawn wood products for export consist of large greenheart squares and dressed lumber for flooring, siding and panelling, prefabricated buildings and building components.

3.3 Equipment installed in a Typical Mill

The typical machinery and equipment of a small sawmill consists of a log winch, a circular headrig and carriage, an edger and a cross-cut saw. The medium size mill will have a log winch, a circular headrig and carriage, a gang saw, an edger, a cross-cut saw and a planing and moulding machine. A larger sawmill of this type will have another gang saw in addition to the above. The large sawmills will have as many as 4 gang saws. There are just a few sawmills using 4 ft. band headrigs. The larger sawmills will have a circular saw headrig, a 6 ft. band headrig, a gang saw, an

edger, cross-cut saw, log winch, planer and moulder. GTL's main sawmill at Houston, Greater Georgetown, consists of a knuckle boom log loader, a live log deck, log haul, two log turners, two 6 ft. hand headrigs and carriages, a bull edger, a board edger, a gang edger, a 6 ft. band re-saw, live rollers, slab chain, green chain and trim saws. A separate shed houses two 4 ft. band re-saws and two edgers. The planing mill consists of two cross-cut saws, four planing and moulding machines and one straight-line edger. Drying facilities consist of a standard dry kiln of 10,000 fbm capacity and a 60,000 f.b.m. low temperature dryer.

3.4 Development Trends

Much improvement has not taken place in the sawmilling industry in Guyana in terms of the establishment of new plants. There are, however, two large new sawmills in the course of construction. One of them is privately owned and the other is a new State-owned company.

Some sawmills, however, have been up-grading the quality of the equipment in their mills by installing such items as log turners and lumber conveying equipment. Recent improvements to the industry have been made in the logging sector by way of a loan from the Canadian International Development Agency to the Government of Guyana for extending to the industry. A second loan from the same source is expected to be made to the sawmilling sector shortly. An FAO/UNDP project is at present up-grading the "bush" sawmills of GTL/GFIC by installing mechanical handling systems in consolidated and improved layouts.

3.5 Problems

Problems in the sawmilling industry are related mainly to the following:

- (a) Selection of suitable machinery and equipment for the conversion of dense tropical hardwoods under primitive conditions.

- (b) The maintenance of machinery and equipment.

Spare parts for machinery and equipment have never been readily available in Guyana but the situation has since worsened and is now critical resulting in frequent breakdowns and downtime of plant.

- (c) High fuel cost. In spite of the abundant supply of wood waste as a source of energy, all the sawmills in Guyana use diesel power or diesel generated electric power for their mills. The one exception is GTL which generates part of its electrical power requirements from a wood waste/steam turbine plant. The company is planning to instal additional capacity to utilize current wood waste and so satisfy all its energy needs.

- (d) Poor maintenance of saws. The maintenance of wide band saws is becoming a serious problem especially at GTL. The problem also exists in the maintenance of large diameter circular headrig saws. Technical assistance from CIDA and FAO is helping to overcome this problem.

4. Secondary Wood Processing Industries

4.1 Range of Products Manufactured

The secondary wood processing industries in Guyana produce the following wood products:

Chairs, tables, cabinets, book-cases, living room and bedroom furniture, office furniture, outdoor furniture, kitchen cabinets, domestic woodenware, toys, novelties, broom-sticks, windows, doors, panelling, strip and parquet block flooring, building components, coffins, boxes and crates, sawn shingles, school furniture, etc.

Because of the ban on the importation of wood products, for example furniture, there is a need to make all such wood products locally and the industry is attempting to meet these needs.

4.2 Product Design in the Furniture Industry

Traditionally, all furniture manufactured locally is copied from that of foreign designs since there are no trained furniture designers in Guyana nor have furniture designs evolved from within the country's cultural background

Under the section of this paper dealing with the furniture woods of Guyana, I mentioned in some detail the characteristics of the species available for furniture manufacture and pointed out that they were unlike those of traditional species used for this purpose elsewhere. I wish now to go on to say that these facts are of considerable importance to the future of the furniture industry in Guyana since upon them will depend the prospects of establishing a viable furniture manufacturing sector.

It is the writer's view that because of the characteristics of the local furniture woods and their limited availability, efforts ought to be made to develop furniture designs suitable to the properties of the particular species and that this should be done against the cultural backdrop of the Guyanese nation. This approach is not a new one (except to Guyana) since it is being practised throughout the world. The approach is most suitable for developing export markets for Guyanese furniture thus designed. Apart from exporting furniture components where species does not matter and functional suitability is all that is required, the approach is indeed the most practicable one.

Product design in the furniture industry in Guyana is therefore of paramount importance and should immediately follow the determination of the properties of available species (for furniture manufacture) for upon it will be determined the nature (and size) of the manufacturing facilities which will be needed to produce the particular types of furniture.

4.3 Level of Technology

The furniture industry in Guyana leaves much to be desired especially with regard to its organization as an industry and its level of machine utilization in the furniture manufacturing processes. This is an industry where there is hardly any division of labour. There are no wood machinists as such nor are there assemblers or finishers. Most of the persons employed are cabinet makers or joiners and each man may make an entire article from the rough lumber to the finished product. There is however, some specialization with regard to products each specializing in such products as chairs, tables or case goods.

Woodworking machinery of basic types are used to rough cut furniture parts and there is little use of jigs and fixtures if any. The furniture can be considered therefore to be hand made and indeed looks that way thus providing the possible advantage that such products may have in specialized, sophisticated markets.

4.4 Automation in Manufacture

The industry has not yet reached the mechanization stage of manufacture so the possibility of automation is at present remote. At the present level of development of the furniture and joinery industries in Guyana, woodworking machinery will be required for units for small-scale production and it is not envisaged that even in the initial stages of industrial expansion of the industry that the units will be comparable in type to those of the industrialized countries.

As the raw material supply improves and the market needs for substantial quantities of particular product types can be met, automation will become necessary both to fulfil the increased volume requirements and product quality. Automation of specialized machining processes for the manufacture of specialty products or components may be introduced earlier according to market demand.

4.5 Specific Technological Problems of the Furniture and Joinery Industries

Specific technological problems of the furniture and joinery

industries include the following:

- (a) The selection of suitable machinery and equipment. Local knowledge of machine woodworking technology is limited and would-be investors are unaware of what exists and what might best suit their needs. This is the result of limited exposure to up-to-date secondary manufacturing plants.
- (b) Wood drying. The lack of knowledge as to how wood dries results in the use of unseasoned and partially seasoned wood and consequent failure in product quality.
- (c) Wood machining. The dense hardwoods of some species present difficulties in sawing, planing and shaping. Limited knowledge precludes the use of suitable tools and cutters and processing technology.
- (d) Improper machine utilization. Lack of knowledge of machine woodworking technology limits users in the scope of operations possible on existing available equipment.
- (e) Technical product design. The absence of good technical product design causes manufacturing problems and poor product quality and performance.
- (f) Wood finishing. Improved methods and processes are required to improve product quality.

4.6

Equipment installed in a Typical Mill

For the purpose of convenience the secondary wood processing industries may be classified as small, medium and large.

The small operator may have no machinery and equipment at all but if he does he will have a 10 inch table model circular saw which may be home made. In addition, he may have a few portable electric tools.

The medium sized operator will have a radial arm saw, a 10 inch circular saw, a 14 inch band saw, a 6 inch jointer, a 14 inch drill press and if he does have a thicknesser, it will be a 12 inch model and a manual lathe.

The large factory will have woodworking machinery of a more heavy duty type and in addition there may be a spindle moulder with dovetailing attachment, an overhead belt sander, a heavy duty chisel mortiser. Very few factories will have a single end tenoner, chain mortiser, overhead router, dovetailing machine or automatic shapers, etc.

The large door manufacturer will have a press but the high cost of plywood does not encourage the manufacture of flush doors. There are no case or frame cramps. Finishing equipment is limited to the compressor and spray gun.

4.7

Development Trends and Problems

There is the suggestion from time to time that a large mechanized furniture factory should be established not only for the purpose of meeting local needs but for export. It is the writer's view that the raw material base for the establishment of such a factory or for a viable secondary manufacturing sector does not yet exist because of the following:

- (a) There are no panel products or veneers.
- (b) There is an absence of solid wood products of the species traditionally suitable for furniture and secondary wood products manufacture.

The above problems could be overcome by:

- (a) Establishing a factory for the manufacture of sliced veneer, plywood and blockboard.
- (b) Identifying local species which may be suitable for specialist type furniture and wood products or as substitutes for traditional species.
- (c) Determining the available volume of each species.
- (d) Developing product designs to suit the characteristics of the species and the preference of the target markets.

- (e) Testing the new products for market acceptance.
- (f) Determining the volume (and share) of the market.
- (g) Matching the species/volume mix to the resource availability.
- (h) If the indications are favourable proceed to identify arrangements for obtaining assured supplies of the species in the volume, dimensions and condition in which they will be required.

Upon being satisfied that suitable arrangements can be made to obtain the raw materials for manufacturing the product needs of the identified markets, the factory may be designed and suitable located.

From the above it is evident that much preliminary work needs to be done in the primary sector before a significant break-through in the secondary sector can be achieved. The establishment of a large furniture factory may therefore require an integrated wood industry complex approach with backward linkages to lumber drying, sawmilling, plywood, blockboard and veneer manufacture, logging, the generation of electricity and provision of other infrastructural requirements depending on the location of the factory.

The above deals only with the problem of obtaining a suitable and assured raw material base. There are other requirements which will need to be planned for such as the training of technical and managerial personnel for the efficient operation of the factory.

5.

Labour

There is a shortage of trained personnel for the operation and management of large scale wood processing enterprises. Trainable labour is however readily available. Vocational training is provided in the area of woodworking but not in sawmilling. No training opportunities for the industry exist in the field of higher technical education.

Guyana Timbers Limited is in the process of establishing a Forest Industry Development Centre which will provide training opportunities in both the primary and secondary wood processing sectors.

6. Local Manufacture and/or Import of Woodworking Machines

6.1 Local Manufacture

No woodworking machines, tools or spare parts are manufactured locally.

6.2 Imports

Guyana imports all its woodworking machinery from countries such as Britain, Canada, the U.S.A., Australia, France, Belgium, Japan, Sweden, the Federal Republic of Germany, Austria, Denmark, Italy and the Netherlands. Table 4 (given on the following page) shows the value and origin of woodworking machinery imports for the years 1971 to 1979.

6.3 Marketing Channels and After Sales Service

Most of the woodworking machinery imported into Guyana is done so through the local sales representative. The representative usually stocks a small quantity of essential spares and this is in the extent of the after-sales service which the company provides. Not being trained or specialized in woodworking machinery sales, the representative is unable to offer advice to clients on the machines which he sells.

6.4 Problems

Problems of obtaining woodworking machinery concern the scope of choice and the selection criteria. Purchasers of woodworking machines are often unable to select the type of machinery most suitable to their needs. The writer is of the view that general selection criteria is needed to determine the capacity, functional suitability and durability at the best possible price. Capacity is understood to mean the measure of the ability of a machine to consume raw material or produce products within a given time.

Functional suitability is the measure of a machine to perform a function or functions satisfactorily. Durability is the measure of the ability of a machine to withstand constant use. The price is

TABLE 4

Imports of Woodworking Machinery (1971 - 1979)
(Guyana \$\$)

Country of Origin	1971	1972	1973	1974	1975	1976	1977	1978	1979
United Kingdom	154,011.	163,520.	350,104.	157,143.	364,955.	255,927.	151,019.	129,488.	-
Canada	58,471.	38,623.	24,209.	7,861.	963.	10,240.	32,540.	12,540.	1,830.
United States of America	82,550.	216,515.	170,495.	199,207.	811,964.	850,953.	252,614.	418,312.	41,357.
Australia	331.	64.	110.	-	2,788.	78,288.	-	190.	-
France	798.	-	-	-	-	-	-	-	-
Belguim	1,554.	2,586.	-	-	-	-	-	-	-
Japan	7,661.	752.	4,986.	-	61,423.	30,265.	-	-	-
Sweden	8,430.	32,004.	19,024.	13,945.	2,374.	-	-	-	-
West Germany	117,696.	207,429.	376,646.	19,907.	59,635.	447,998.	-	-	-
Austria	917.	5,416.	5,729.	-	-	-	-	-	500.
Trinidad and Tobago	-	5,416.	-	-	-	-	-	-	-
Surinam	-	5,416.	-	-	-	-	-	-	-
Denmark	-	-	214.	-	-	-	-	-	-
Italy	-	-	-	-	-	257.	12,445.	-	-
Federal Republic of Germany	-	-	-	-	-	-	207,800.	13,753.	844,835.
Netherlands	-	-	-	-	-	-	-	56,420.	64,769.
TOTAL	432,419	66,944	951,517.	401,099.	1,304,102.	1,679,863.	672,334.	630,703.	935,291.

usually the most important consideration in the selection of machinery and equipment in a developing country. Where technical competence to evaluate machinery and equipment needs is unavailable and money is in short supply, the price of the machinery is unfortunately the determining factor taking precedence over the more important criteria of capacity, functional suitability and durability.



