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PROSPECTS FOR INTEGRATION IN THE WOODWORKING
INDUSTRY OF THE CARIBBEAN COMMUNITY

UC/CAR/86/201

Technical report: The situation in Barbados*

Prepared for the CARICOM Secretariat
by the United Nations Industrial Development Organization

Based on the work of Pietro Borretti, woodworking consultant

Backstopping officer: A. V. Bassili
Industrial Management and Rehabilitation Branch

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1. Introduction

1.1 Title and number of the project under which this country report has been prepared:

Development of integrated industry programme for the woodworking and furniture industry sector in CARICOM - UC/CAR/86/201

1.2 Cooperating Agency:

Caribbean Community Secretariat, Georgetown, Guyana

1.3 UNIDO consultant:

Pietro Borretti, Consultant in Woodworking Industry Sector.

1.4 CARICOM counterpart:

Ivor Carryl, Industrial Economist, Economics and Industry Division.

1.5 Main institutional contact in Barbados:

Barbados Industrial Development Corporation

1.6 UNIDO Backstopping officer:

Antoine V. Bassili, Senior Industrial development Officer, Industrial Rehabilitation and Management Branch, IIS

1.7 Period of mission to Jamaica:

4 to 11 April 1987

1.8 Terms of reference:

To survey selected furniture plants in order to establish their requirements for imported lumber and evaluate the efficiency of those plants in the utilization of timber inputs.

1.9 Main activities:

- (a) Visits to selected furniture plants;
- (b) Review of shipping links with Guyana and Belize;
- (c) Review of lumber import trends;
- (d) Reporting to the Guyana Forestry Commission and the Belize Forestry Department on lumber requirements of Barbados' furniture and joinery industry.

1.10 Background

Among the primary aims of the Caribbean Community Secretariat (CARICOM), established in 1973, are the coordination of economic policies and development planning, and setting up of a special regime for its less developed members. In line with these aims, the CARICOM has developed an industrial programme for the industrial development of its 13 member states. The emphasis is on the production of goods and services for the regional market with a view to minimizing costly imports.

The development of the timber industries sector - and in particular the promotion of the supply of wood products from within the Region - has been assigned a priority role by the CARICOM secretariat, since the Caribbean Community as a whole is heavily dependent on extra regional sources of supply to meet its lumber demand.

A regional project of assistance to the CARICOM - entitled 'Development of Integrated Industry Programme for the Woodworking and Furniture Industry Sector in CARICOM' - was undertaken in this connection in 1987 by the UNIDO consultant Pietro Borretti who visited nine of the twelve CARICOM countries together with his counterpart Ivor Carryl.

As a result of the missions the consultant prepared eleven reports to highlight the situation to the CARICOM Secretariat and the authorities of the member states the situation of the sector and its potential. He also recommended certain immediate measures for the development of the sector. This report concerns the mission undertaken by the consultant in Belize.

1.11 Related reports prepared under project UC/CAR/86/201:

The eleven reports prepared under the project include the following:

- (a) The project's terminal report (No. IO/R.52) entitled 'Prospects for Integration in the Woodworking Industry of the Caribbean Community, dealing with the situation in the region as a whole. The report proposes, inter alia, the implementation of three projects of a regional scope:
 - (i) Study on the establishment of a timber distribution centre in Barbados or Trinidad to facilitate the supply of lumber from within CARICOM;
 - (ii) Holding a regional WOODTECH course/exhibition of woodworking machinery in Barbados in order to promote the transfer of technology for the small-scale furniture and joinery industry in the Caribbean.
 - (iii) Intra-regional tool maintenance training programme for the furniture/joinery industry;

- (b) Nine country reports covering the CARICOM member states^{1/} visited by the consultant and his counterpart in the course of the project; and
- (c) A technical report on the 'Selection of woodworking equipment for the small-scale furniture/joinery industry in the Caribbean Community (report No. IO/R.53). The report covers both wood processing and tool maintenance equipment. It also includes sawdoctoring equipment for the maintenance of inserted teeth of circular saw blades, gang saw blades and band resaw blades.

2. Summary

Barbados is the CARICOM country with the least area of commercial forests (4,000 hectares) and depends entirely on imports to meet its lumber demand.

The country is the third largest lumber importer in CARICOM after Trinidad and Jamaica. A total of 19.4 million BM (45,782 m³) of lumber was imported in 1985 of which only 15.5 percent from a CARICOM source - Guyana.

The main single lumber species imported is Pine (41 percent of the total imports) supplied from Honduras and the USA. As in the other timber-deficit CARICOM countries, the main furniture-type of timber imported is Mahogany from Brazil. Pine is delivered in regular monthly shipments with favourable payment terms of up to 120 days.

A servicing company, the Barbados Furniture Trading Company (BFTC), was set up with the support of the Government and the Barbados Development Bank to promote the export potential of the furniture industry towards the USA markets, with the aim, among others, of importing and kiln drying lumber for the leading export-oriented furniture plants. The arrangement, however, has run into serious difficulties.

Despite the traditional lumber link with Guyana, Barbados has not imported so far any furniture-type timber from that country. As a direct result of the UNIDO/CARICOM mission to Barbados, specific requests for quotations were obtained for Hububalli, Determa and Crabwood species from Guyana and Santa Maria from Belize. Hububalli was seen as having a very good potential for turned furniture parts and panel door components; while Determa, Crabwood and Santa Maria were identified as potential substitutes to Brazilian Mahogany whose supply is becoming increasingly scarce.

The emergence of larger furniture manufacturing plants in Barbados had been favoured by the significant export opportunities provided by the Trinidad and Tobago market during the oil-boom period. In 1983, a record of US\$ 5.8 million worth of furniture was exported from Barbados to Trinidad. This amount, however, dropped to US\$ 0.6 million by 1985 due to the intervening oil revenue slump in Trinidad.

^{1/} Antigua, Barbados, Belize, Dominica, Guyana, Jamaica, St. Lucia, St. Vincent, Trinidad and Tobago.

Considerable efforts are now being made by both the furniture industry and the Government departments concerned to re-direct furniture exports towards extra-CARICOM destinations and in particular to the USA. For this to succeed, however, a major effort will have to be made by the industry to introduce more modern and appropriate wood processing methods and equipment in view of the much higher quality standards expected in overseas markets as compared to those acceptable in CARICOM markets.

The following recommendations are made towards promoting the imports of furniture-type lumber from CARICOM sources and promoting the efficiency of the furniture/joinery manufacturing sector:

- (a) To study the feasibility of setting up a timber distribution centre in Barbados stocked with furniture-type lumber from Guyana and Belize to serve the local requirements as well as those of the other CARICOM Leeward and Windward islands. A draft project document in this respect is attached to the project's terminal report (reference No. IO/R.52).
- (b) To assist the Barbados Furniture Trading Company (BFTC) to set up a tool maintenance service centre for the benefit of the furniture/joinery in order to (1) extend the serviceable life of expensive, imported, cutting tools, such as carbide-tipped circular sawblades; (2) contribute towards reducing equipment break-down, and (3) contribute towards improving the quality of finished products. A draft project document in this respect is given in Annex III.
- (c) To provide factual guidance to the furniture/joinery industry sector, in particular to the small scale plants, in the selection of appropriate modern machinery, with emphasis on the introduction of dowel and round-end tenon techniques. A separate report has been prepared by the Consultant in this respect entitled: "Guidelines on the selection of woodworking equipment for the small scale furniture/joinery industry in the CARICOM community" (report reference No. IO/R.53).

3. Forest Resources

Barbados is the CARICOM country with the least area of commercial forests consisting of only 4,000 hectares, with a volume per hectare of 80 m³, and comprising of a limited number of Mahogany trees. To all practical effects, however, Barbados depends entirely on imports for its lumber supply and ranks as the third largest lumber importer in CARICOM after Trinidad and Jamaica.

4. Lumber Imports and Consumption

A total of 19.4 million BM (45,782 m³) of lumber was imported by Barbados in 1985, at a cost of B\$ 16.9 million (US\$ 8.5 million) of which only 15.3 percent, or 6,911 m³ was imported from a CARICOM country, Guyana. Barbados' lumber imports by main countries of origin in 1985 are shown in the following table.

Table 1: Lumber imports to Barbados, 1981-85.

Countries of origin	m ³
Honduras	20,405
USA	12,215
Canada	2,267
Guyana	6,917
Brazil	2,442
Other	1,536
Total imports	45,782
Cu FT	1.6 mil

As much as 41 percent (18,547 m³ or 78.8 million BM) of lumber imported in 1985 consisted of coniferous species with the major suppliers being Honduras (70 percent) and the USA (24 percent). The totality of the Mahogany imported in 1985 was from Brazil (2,000 m³ or 847,600 BM). Lumber supplied in a dressed form or as panelling and flooring boards made up 53.7 percent of the total lumber imports.

The majority of imported Pine consisted of Pitch Pine from Honduras and White Pine from the USA. Both varieties of Pine are supplied mostly by two United States Companies, one of which is involved in sawmilling activities in Honduras. Most of the Southern Yellow Pine (60 to 70 percent) is treated for protection against termite and fungal attack. The importers receive their Pine supplies in bundled form in regular monthly shipments from ports in the USA and Honduras with payment terms of up to 120 days.

Trial quantities of lumber, mainly Mahogany, have in the past been imported from Belize through the lumber importer DeCosta. Minor supplies of Gommier species were also received from Dominica. However, no lumber was imported in 1985 from these two countries.

The Barbados Furniture Trading Company (BFTC) had been set up by 34 furniture manufacturers with the assistance of the Government and of the Barbados Development Bank, having as one of its objectives to assist the industry in the importation and kiln drying of lumber. However, this arrangement has yet to become fully operational and the bulk of lumber used in furniture manufacturing is imported by agents and distributed either directly to the major furniture factories or sold through lumber-yard retailers.

5. Lumber Prices, Import Duties and Landing Charges

At the time of the mission, lumber retail prices per BM were as follows:

	B\$	US\$
(a) Mahogany	3.50 to 4.50	1.76 to 2.27
(b) Pine	1.60 to 2.45	0.80 to 1.24

The import duty of lumber of non-CARICOM origin is B\$ 1.27 per cubic meter. A 5 percent consumption tax is paid on the CIF and duty-paid value, plus 3 percent stamp duty on the CIF value. The consumption tax on CIF value and the stamp duty applies also to CARICOM imports.

In addition to the above charges, there is a landing, storage and delivery charge (LSD) of US\$ 30 per freight ton on bulk cargoes shipments. The LSD charge for 20 ft. containers is US\$ 500.

6. Furniture Exports

The furniture manufacturing sector of Barbados grew considerably between 1978 and 1983 to meet the demand for furniture generated by Trinidad's booming oil-based economy. Exports peaked in 1983 with B\$ 12.6 million of which 91.9 percent accounted for furniture exported to Trinidad and Tobago. Since 1983, however, furniture exports have declined drastically due to the intervening oil revenue slump in Trinidad and Tobago, and by 1985 had dropped by 90.5 percent down to B\$ 1.2 million. In the meantime, the share of furniture exports to extra-regional destinations grew from 2 percent in 1981 (B\$ 106,987) to 31.7 percent in 1985 (B\$ 393,971). According to industry sources, a further deterioration in furniture export activities was experienced in 1986.

Considerable efforts are now being made by both the furniture industry and Government departments concerned to re-orient furniture exports towards extra-CARICOM destinations.

The furniture export trends in the period 1981-1985 are shown in the following table:

Table 2: Barbados Furniture Export Trends, 1981-1985

Year	Destination	Exports BS	% Share of Furniture Exports	% Change over pre.yr
1981	Total:	5 417 637		
	CARICOM	5 310 650	98.0	
	Trinidad and Tobago	4 735 916	87.4	
	Extra-Regional	106 987	2.0	
1982	Total:	11 218 550		107.1
	CARICOM	11 088 941	98.8	108.8
	Trinidad and Tobago	10 515 513	93.7	122.0
	Extra-Regional	129 609	1.2	21.1 (+)
1983	Total:	12 653 336		12.8
	CARICOM	12 040 952	95.2	8.6
	Trinidad and Tobago	11 624 119	91.9	10.5
	Extra-Regional	612 384	4.8	372.5
1984	Total:	4 480 547		-64.6
	CARICOM	4 237 683	94.6	-64.8
	Trinidad and Tobago	4 067 104	90.8	-65.0
	Extra-Regional	242 864	5.4	-60.3
1985	Total:	1 242 218*		-80.0
	CARICOM	848 247	68.3	-80.0
	Trinidad and Tobago	754 397	60.7	-81.5
	Extra-Regional	393 971	31.7	62.2

* 6.7 percent of the total gross output of the furniture industry sector.

Source: Barbados Statistical Service.

7. The Furniture Industry

The furniture industry of Barbados consists of a large number of small workshops and a few medium-size plants. Mechanised manufacturers are estimated to be around 70. The total manpower of the sector has been estimated to be in the region of 400 in 1985 (up from 300 in 1975) - a 3.3 percent share of the employment in Barbados' manufacturing sector. Also in 1985, the furniture industry sector took a 1.7 percent share (B\$ 18.5 million) of the gross output in manufacturing and a 2.3 percent share (B\$ 6.1 million) in terms of added value.

The following furniture plants were visited in the course of the mission:

- Angelus and Co. Ltd.
- Hampden's Furniture Ltd.
- Kirton's Furniture Ltd.
- Lashley and White Ltd. (furniture and door manufacturer)
- Legacy Furniture Ltd.

Of the furniture factories visited, the Legacy Plant - Barbados' best equipped furniture factory, which has been set up exclusively for exporting to the USA markets - has now been temporarily closed down due partly to cash-flow problems.

The plant is equipped with a wide range of modern equipment suitable for the serial production of furniture on a fully mechanised basis. In particular, the plant is geared for the production of both dowel and tenon joints - a main prerequisite for developing an export potential - and a variety of solid-wood components, including complex parts such as Louis XV chair legs. The plant's equipment includes, among others, a carving machine, multiple copying lathe and a large double end tenoner, which would allow mass production of panel-door components.

Also available at the Legacy's plant are an over-sophisticated numerically-controlled router, and computer facilities as an aid in production control, costing, inventory control, financial reporting, etc. An equipment gap noted was the absence of clamp carriers, which are essential for the production of glued-up panel components. The plant would also benefit from installing equipment such as a dust extraction system, dry kiln and tool maintenance equipment designed to weld new carbide tips on circular saw blades and grind side clearance on new tips.

With the exception of the Legacy plant, most of the other furniture factories visited lacked up-to-date equipment for the production of accurate tenon and dowel joints needed to produce furniture of export standard.

In one particular furniture plant which had participated in processing a trial order for the USA, it was noted that round-end mortices were made on a routing machine, while the matching tenons were produced by two circular saw blades mounted on a spindle moulder and then rounded off by hand to fit the slot mortice. This resulting in low productivity and problems in producing interchangeable parts.

Elsewhere, large-size tenons for door manufacture were machined by feeding the workpiece on a spindle moulder without any jig or guide. The operation could have been performed much more efficiently and safely by mounting on the spindle moulder a tenoning sliding table with a clamping device. In another plant, tenons were produced on a radial saw equipped with a trenching head, with resulting difficulty in obtaining accurate fitting of tenons.

In another instance, a routing machine was used for producing dovetailing joints - again a technique not satisfactory for the purpose of serial production.

One of the major constraints in the development of the industry, especially of export-oriented factories, is the lack of kiln drying facilities. A kiln unit was installed by the Barbados Furniture Trading Co. Ltd. (BFTC) as a service to a consortium of 37 local export-oriented furniture manufacturers. The BFTC scope was meant to include purchasing of lumber as well. The whole programme, however, has run into serious problems and the Barbados Industrial Development Corporation is now considering changing the BFTC role from servicing to manufacturing.

Although the concept of common kiln facilities appears very attractive at first sight, the consultant can think of no case where this arrangement has been successfully applied for the benefit of the furniture industry unless large series production were involved allowing the utilization of standard lumber thicknesses in large enough quantities for economic kiln loading - which is not the case in Barbados or in CARICOM as a whole. Even if such common kiln drying facilities were equipped with small-size kilns, the difficulty would remain of coordinating the needs for lumber drying of the many, small woodworking plants.

It would seem, therefore, that the furniture factories aiming towards extra-CARICOM markets might have to set up their own small-capacity kilns. Plants manufacturing furniture for the local market, and requiring lumber dried at about 15 percent moisture content, may want to choose between obtaining lumber ready-dried from lumber yards or installing inexpensive solar kilns of the type introduced in Georgetown by the Guyana Forestry Commission with UNIDO assistance.

As elsewhere in CARICOM, with the exception of Belize, the dominant furniture style in Barbados is the colonial type characterised by heavy construction and general use of turnings and spindles. The most popular species is dark-stained and glossy-finished Mahogany. However, more contemporary furniture of simple design is now being introduced based on the utilisation of Pitch Pine. Semi-glossy finishes are normally applied in the case of Pinewood furniture. Pine furniture is generally sold at a cheaper price than traditional Mahogany furniture as it seems to cater for the younger generation.

Very few of the plants visited were equipped to carry out tool maintenance work effectively. As the scope of the Barbados Furniture Trading Company (BFTC) is now being reconsidered, it is recommended that the provision of comprehensive tool-maintenance services be included in its new objectives.

8. Selected Technical Assistance Requirements of the Furniture Industry

- (a) The project data sheet for the establishment of a Tool Maintenance Servicing Centre at the BFTC for the furniture/joinery industry is provided as part of this Report. (See Annex III.)
- (b) Selection of following woodworking machines:
 - round-end tenoner of semi-automatic type
 - copying turning lathe of semi-automatic type

- universal multi-boring machine
- slotting machine of the automatic type
- manually operated slotting machine
- dovetailing machine of the single cutter type
- low-cost combination cutters for easy maintenance.

Purchasing specifications for the above wood processing equipment and of the tool maintenance equipment required for the establishment of the Tool Maintenance Servicing Centre by BFTC are given in the separate report by the Consultant entitled: "Guidelines in the selection of woodworking equipment for the small-scale furniture/joinery industry in the Caribbean Community" (report reference No. IO/R.53).

- (c) Information on the introduction of jig making and low-cost automation as a means to increase productivity. UNIDO's manuals on these topics (ID/265 and IO/154 Rev. 1) will be provided by UNIDO to the furniture factories listed in Annex I.

9. Shipping Links

(a) Guyana-Barbados

- (i) Twice-a-month service by WISCO
Freight rates: US\$ 1,775 per 20 ft. container. Charges include: basic rate (US\$ 1,100); Guyana handling (US\$ 175) and LSD (US\$ 500). Barbados' LSD rate is the third highest in the CARICOM after Montserrat (US\$ 675) and St. Kitts (US\$ 575).
- (ii) Tramp boat chartered by the Guyana Forestry Commission. No regular schedule.
Freight rates for bundled lumber: US\$ 115 per cubic meter. Charges include basic rate (US\$ 75.00); Guyana port handling (US\$ 10) and destination LSD (US\$ 30).

(b) Dominica-Barbados

- (i) Service at an 8-day frequency on Ro/Ro vessel "Caribe Trader" by Trailer Marine Corporation (TMT).
Freight rates: US\$ 1,595 and US\$ 2,150 for 20 and 40 ft. containers respectively. The rates are inclusive of loading and unloading charges. The vessel carries both containers and flat bed trailers.
- (ii) Fortnightly service by coastal vessel 'Stella 2' to Saint Lucia and Barbados. Handled by shipping agents Witchurch and Co. Ltd.

Belize Barbados

- (i) Weekly service to Belize-Barbados via Miami, handled by Tropical Shipping, Belize. Freight rates:
- US\$ 3,512 per 40 ft. container (basic rate)
 - US\$ 7.50/2000 pounds (container loading charge)
 - US\$ 5.50/2000 pounds (port authority charge)

- (ii) Shipping arrangement identified by the Forestry Department, Belmopan, Belize. Freight rates:
- US\$ 1,600 per 20 ft. container (basic rate)
 - US\$ 2,400 per 40 ft. container (basic rate)
 - US\$ 2.70/m³, cost of delivery and return of container to and from Belmopan, as applied to 20 ft containers
 - US\$ 5.83/m³, cost of delivery and return of container to and from Belmopan as applied to 40 ft. containers.

10. Lumber Imports Potential from CARICOM Sources

Through the years Barbados has remained the main importer of Guyana lumber in CARICOM and the fifth main destination of total lumber exports from Guyana. The best known species from Guyana are Purpleheart and Greenheart which, however, are exclusively used in building construction, with Purpleheart being particularly utilised in various joinery work such as staircase components, windows sills, etc.

Despite Purpleheart's attractive shade and the ease with which it can be finished, none of the furniture manufacturers contacted would use it as furniture timber because of its blunting effect on tools. This problem, however, could be minimised by using carbide-tipped tools.

Contrary to the situation in Trinidad, where local Crabwood is already in use in the furniture industry, Barbados furniture manufacturers are familiar neither with this species nor with the Determa species. Samples of these two timbers had been provided from Guyana to some furniture manufacturers but no follow-up ever materialised on the part of potential suppliers.

As in Trinidad, keen interest was shown on the part of furniture manufacturers as well as of lumber importers in placing orders for the following timber species: Hububalli, Determa, Crabwood, Locust and Kerti-Silverballi.

Hububalli was seen as having a good potential in furniture making on account of its attractive grain, easy finish and its high suitability for turned furniture components. A major lumber importer, Blades and Williams Ltd., saw a considerable potential in using Hububalli for panel-door production. Panel doors are currently manufactured locally and are also imported from the Taiwan Province of China, Brazil and Costa Rica. The introduction of Hububalli in door production would offer the possibility of Guyana supplying dimension-stock components - rather than just sawn or dressed lumber.

A unanimous interest was shown for Determa and Crabwood in view of their potential for substituting Mahogany. One particular furniture plant, Kirton's Furniture Ltd., would consider purchasing actual machined parts and turnings made of either species.

A furniture and door manufacturer, Lashley and White Ltd., would consider utilising the Kerti-Silverballi and Simarupa species as a

substitute to Pine in flush-door manufacturing, provided these species from Guyana can compete in price with Pine supplied from the USA and Honduras. A particular plant, Hampden's Furniture, expressed interest in the Locust species in addition to Determa and Crabwood. According to test results provided by the Guyana Forestry Commission, Locust has mechanical and workability properties suitable for furniture making. However, further tests should be carried out to validate the original findings in view of the fact that some end-users have encountered difficulties in the utilisation of this species. As for Crabwood, it is recommended that it be dried to about 15 percent moisture content in order to minimise warping problems encountered by some of the end-users.

Imported panels of Medium Density Fibreboard (MDF) faced with Mahogany veneer are being introduced in furniture manufacture, although not to the same extent as in Trinidad and Tobago and with a lower degree of finishing standard. The same result is expected to be brought about by the recent introduction of imported melamine-faced particle board in the manufacture of panel furniture. The introduction of these new wood-based panels is bound to affect, in the long term, the demand for solid timber, and in particular, for lumber components of large widths.

Some furniture manufacturers are already familiar with the Commier species from Dominica and Santa Maria from Belize, and it appears that both species would be well received for wide utilisation in the furniture industry. Santa Maria is a present being exported to the USA by one of the largest Belizean sawmills.

11. Specific Requests for Lumber Quotations/Samples

1. Requirements of Kirton's Furniture Ltd.

P.O. Box 486, Cluster Block
Harbour Industrial Park, Barbados
Tel: 4264594

- 1.1. CIF Quotation for turned and sanded spindles of 12" length in Crabwood, Determa and Santa Maria as per samples. Quantity required: 6,000 pieces per year.
- 1.2. CIF Quotation for Crabwood, Determa and Santa Maria sawn lumber as follows:
 - thickness: 1", 2", 3", 4"
 - width: random 6" to 12"
 - grade: prime and standard
 - length: 8' and up
 - moisture content: 12 to 16 percent
 - quantity required: 7,204 BM (17 m³)
- 1.3. Quotation CIF for Crabwood, Determa and Santa Maria lumber with the following specifications:
 - cross section: 2" x 2" and 3" x 3"
 - length: 20"
 - grade: prime
 - moisture content: 12 to 16 percent
 - quantity required: 4,238 BM (10 m³)

- 1.4. CIF quotation for Crabwood, Determa and Santa Maria sawn lumber as follows:
 - cross section: 4" x 4"
 - length: 6"
 - grade and moisture content as above
 - quantity required: 2,542 BM (6m³)

2. Requirements of Blades and Williams Ltd.
(Lumber importers)
P.O. Box 279, Bridgetown, Barbados
Tel: 80942 and 62691 Telex: 2320
 - 2.1. Trial order, CIF quotation for sawn lumber Hububalli, Determa and Santa Maria species for panel door construction. Assorted sizes as follows:
 - 2" x 5 1/4" x 7' 3" (door slides)
 - 2" x 8 1/4" x 3' (top and bottom rails)
 - 2" x 3 3/4" x 3' (intermediate horizontal rails)
 - 2" x 3 1/4" x 18" (central vertical lines)
 - sizes of in-fill panels will be given later
 - grade: Prime
 - quantity: 60,000 BM (141 m³)

 - 2.2. Lumber samples of Determa, Hububalli, Crabwood and Santa Maria as follows:
 - size: 2" x 6" x 12'
 - quantity: 5 pieces each species

3. Requirements by Lashley and White Ltd.
(Furniture and Door Manufacturer)
Chelsea Gardens
Chelsea Road
St. Michael
 - 3.1. Quotation CIF for supply of partly dressed lumber for flush-door construction specifications:
 - size: 1 1/8" x 1 1/2" x 7' or 14' long
 - wider faces to be planed to finish thickness of 1 1/2"
 - narrower faces not to be planed
 - species: Simarupa and Kereti Silverballi as a substitute to White Pine
 - moisture content: 12 to 15 percent
 - quantity required: 11,000 BM (approx. 26 m³) per month

ANNEX I

List of Persons Met

Mr. P. F. Ryan	UNIDO Senior Industrial Development Field Adviser
Mr. A. Vigilante	UNDP Assistant Resident Representative
Mr. S. Frederick	Economist, Economic Section, Ministry of Trade
Mr. E. Douglas	Economist, Caribbean Association of Industry and Commerce, P.O.Box 259, Bridgetown
Mr. V. L. Forsythe	Project Officer, Agriculture/Industry, Caribbean Development Bank, P.O.Box 408, Wildey, St. Michael
Mr. L. Kirton	Managing Director, Kirton's Furniture Ltd., 486, Cluster Block, Harbour Industrial Park, Bridgetown
Mr. O. Forde	Production Manager, Barbados Furniture Trading Company Ltd. (BFTC), Spring Garden Highway, P. O. Box 478, Bridgetown
Mr. R. D. Edghill	Managing Director, Legacy Furniture Ltd. Bank Hall, St. Michael
Mr. J. Hampden	Managing Director, John Hampden's Furniture Ltd., Six Roads Industrial Park, St. Philip
Mr. G. Payne	Production Manager, John Hampden's Furniture.
Mr. A. C. Roche	Sales Manager, C. Angelus & Co. Ltd. Furniture Manufacturers, Grazottes Industrial Park, St. Michael
Mr. R. Cox	Production Manager, C. Angelus & Co. Ltd.

Mr. C. Lashley	Production Manager, Lashley & White Ltd. Furniture and Door Manufacturers, Chelsea Gardens, Chelsea Road, St. Michael
Mr. B. G. Blades	Manager, Blades & Williams Ltd., Lumber Importers, P. O. Box 279, Bridgetown
Mr. M. Dec Miller	Manager, Plantations Trading Co. Ltd., Lumber Importers
Mr. T. Moore	Executive Director, Da Costas Ltd. Shipping Agents, P. O. Box 103, Bridgetown
Mr. R. Dec. Batson	Manager, Lumber Department, Da Costas Ltd.
Mr. W. M. Watson	Manager, Manning & Challenor Ltd., Lumber Importers, P.O.Box 176, Bridgetown
Mr. A. J. Phillips	Managing Director, Barbados Lumber Co. Ltd., Waterford, St. Michael

ANNEX II

Properties of Selected Guyanese, Belizean and Dominican
Timber Species Suitable for Furniture Manufacturing

Content

A. Guyana Species

1. Andiroba (Crabwood)
2. Courbaril (Locust)
3. Determa
4. Hububalli
5. Purpleheart
6. Silverballi
7. Simarupa

B. Belize Species

8. Santa Maria

C. Dominica Species

9. Commier

D. Exporting contacts

1. Andiroba (Crabwood)

- Scientific name: Caropa guianensis (family: Meliaceae)
- Other names: Krapa, Guino, Figueroa, Tangare, Carapa, Crappo
- Wood appearance: Heartwood varies from pale pink to rich red-brown when freshly sawn, darkening to a fairly uniform dull reddish-brown.
- Sapwood pale brown or oatmeal coloured, not always sharply defined. Wood resembles a plain mahogany in appearance, but lacks its natural lustre. Texture medium to coarse; grain generally straight but sometimes interlocked.
- Bole 50-80 feet long; diameter 16-20 inches.
- Physical and mechanical properties: Comparable in strength to European Beech (Fagus spp.). Weight about 610 kg/m³ (39 lb/ft³) seasoned. Small movement. Moderately hard with good mechanical properties and is fairly stable in use.
- Natural durability: Heartwood is moderately durable and fire resistant. Logs liable to attack by ambrosia (pinhole-borer) beetles.
- Timber processing: Drying: Dries fairly well but rather slowly with a tendency to split in the initial stages. Kiln schedule C.
Working: Saws without difficulty. Interlocked grain makes planing difficult. Works easily and turns well, finishing smoothly.
Assembly: Glues and holds nails well. Tendency to split on nailing.
Finishing: Takes stain and polishes satisfactorily.
- Uses: Suitable for general carpentry, furniture, cabinet work, turnery and interior joinery.
- Supplies: Occurs in reasonable quantities in Guyana. Regular supplies possible.

2. Courbaril (Locust)

- Scientific name: Hywenaea courbaril (family: Caesalpinaceae)
- Other names: Copalier, Algarrob, Gaupinál, Jatoba.
- Wood appearance: Heartwood light brown to brown often with dark streaks and with a subdued golden glow. Sapwood of whitish grey colour is sharply defined. Texture medium coarse.
- Grain straight, lustre medium, uniform vessel lines distinct.
- Bole 60-80 feet long, diameter 24-36 inches.
- Physical and mechanical properties: Very hard and strong. Weight varies from 910 to 1000 kg/m³ (57-62 lb/ft³) seasoned. Moderate shrinkage, relatively stable once dry. Good mechanical properties, especially elasticity.
- Natural durability: Very resistant to decay.
- Timber processing: Drying: dries readily without distortion or splitting.
Working: moderately difficult to work but finishes smoothly. Planes and turns without difficulty. Good bending to steaming process.
Assembly: glues well, but difficult to nail. Fastenings are held well.
Finishing: Finishes smoothly. Polishes and varnishes without difficulty.
- Uses: A wood of decorative appearance suitable for use in the manufacture of high grade furniture, cabinet work, decorative joinery and veneer. Also used for ship-building, general construction, and the making of tool handles and croquet mallets.
- Supplies: Occurs widely but not abundantly in the Guyana forests. Regular supplies in modest quantities are available.

3. Determa

Scientific name: Ocotea rubra (family: Dauriceae)

A.T.I.B.T. standard name: Louro Vermelho

Other names: Wana, Grignon Franc, Red Louro

Wood appearance: Pale reddish-brown with subdued golden lustre. Grain straight to irregular, texture rather coarse. Bears some similarity to a dense grade of African Mahogany. Bole 60-80 feet long, cylindrical; diameter 24-36 inches.

Physical and mechanical properties:

Average weight about 620 kg/m³ (39 lb/ft³). Hardness - soft to medium. Strength class 5/4, generally below the average for its density. Movement low to moderate. Determa responds extremely slowly to atmospheric changes and is thus very stable in use.

Natural durability:

Determa heartwood is rated durable in graveyard and pure culture tests. The wood equals Honduras Mahogany in its resistance to termites, and is also fairly resistant to marine borers.

Determa is highly resistant to moisture absorption and has excellent weathering characteristics.

Timber processing

Drying: kiln schedule E. Because of the slow diffusion rate of the moisture in the wood Determa is difficult to season.

Working: saws well, works easily with all tools; turns and carves well.

Finishing: stains and polishes well after filling.

Uses:

A general utility timber, widely used for all kinds of indoor and outdoor work. Uses include boat and ship building (keelframe, planking and decking); carriage and waggon building; building construction both interior and exterior (framing, stairs, windows, sash frames, flooring strips, interior trim); cooperage, furniture and cabinet work. The wood is suitable for bending to a moderate radius of curvature.

Supplies:

Available in considerable quantities.
Supplies adequate to meet all likely
requirements, both in quality and quantity.
The timber is available in large sizes.

4. Hububalli

- Scientific name: Loxopterygium sagotii (fam.: Anacardiaceae)
- A.T.I.B.T. Standard name: Slangenbout
- Other names: Koika, Onotillo, Kooel pialli
- Wood appearance: The wood is brown to reddish-brown, attractively figures; contains numerous narrow to rather wide darker stripes and streaks. Lustre medium. Texture medium, uniform. Grain straight, sometimes interlocked or wavy.
- Physical and mechanical properties: Weight about 50 lb/ft³. Strength class 4, moderately hard; toughness medium to rather brittle. Movement rather low. Air dry Hububalli compares closely with Burma Teak in all strength properties except compression and tension perpendicular to grain.
- Natural durability: Resistant to decay; moderately resistant to termites. The wood is highly resistant to moisture absorption.
- Uses: Because of its attractive figuring and relative scarcity the wood is best suited for panelling, high-grade furniture and cabinet work.
- Supplies: The wood is frequently found in the far interior. Moderate quantities are available for export.

5. Purpleheart

- Scientific name: Peltogyne pubescens and P. venosa (family: Caesalpinaceae)
- A.T.I.B.T. standard name: Amarante
- Other names: Amaranth, Morado, Pau Roxo, Bois Violet, Barabu
- Wood appearance: Dull brown when freshly cut, rapidly oxidizes to violet-purple on exposure to light and gradually toning down in course of time to dark purplish-brown. Sapwood whitish or cream coloured. Grain generally straight, sometimes wavy or interlocked. Texture moderate to fine. Bole 50-90 feet long, cylindrical; diameter 20-44 inches.
- Physical and mechanical properties: Wood is very tough, strong and resilient. Weight about 860 kg/m^3 (54 lb/ft^3) seasoned. Movement small bending strength 147 N/mm^2 (21399 lbf/in^2) modulus of elasticity 1600 N/mm^2 (242000 lbf/in^2) compression parallel to grain 78.5 N/mm^2 (11380 lbf/in^2). Shock resistance medium.
- Natural: Highly resistant to decay, termites and fire. Heartwood very durable and extremely resistant to preservative treatment, but sapwood is permeable.
- Timber processing:
Drying: dries well and fairly rapidly with little degrade. Kiln schedule E.
Working: not difficult to work. Saws, planes and turns well, finishing smoothly; takes a high polish.
Assembly: it takes glue well and holds nails and screws satisfactorily.
Finishing: gives good results when lacquered or polished.
- Uses: Possesses high strength and very good durability and is an excellent structural timber suitable for heavy outdoor constructional work such as bridges, dock work and park benches. As flooring it has high wearing quantities and is suitable for most conditions of traffic. Has been used successfully in chemical plants for vats,

filter press plates and frames. Suitable for high-grade furniture and turnings. Also used for making billiard cue butts, tool handles, interior and exterior joinery. A valuable wood for its attractive appearance and its strength.

Supplies:

Regular supplies are available.

6. Silverballi (Group)

Family:

Lauraceae

Scientific names:

Brown: Licaria canella
Kereti: Ocotea puberula, Ocotea wachenheimii, Ocotea oblonga
Kurahara: Ocotea glomerata
Swizzlestick: Ocotea schomburgkiana
White: Ocotea canaliculata
Yellow: Aniba ovalifolia

A.T.I.B.T. standard name:

Canela

Other names:

Pisie, Caralou, Canelo, Louro Branco, Inamui, Preto

Wood appearance:

In Guyana the Silverballi group is divided into 'hard' and 'soft', with the dividing line being put at an air dry specific gravity of 37 lb/ft³.

The heartwood ranges from greyish through yellowish buff to light brown and darkens on exposure. Lustre medium to high. Texture rather fine to moderately coarse. Grain straight. The wood usually has a pleasant aromatic odor.

Bole 60-70 feet long; diameter 16-24 inches.

Physical and mechanical properties:

The 'hard' Silverballi is rather light to heavy with densities from 22 to 37 lb per cubic foot. The group is generally in strength class 2.

Movement rather low; the lighter species shrink less than the heavier types.

Natural durability:

Moderately resistant to insects and decay, but susceptible to termites. Highly resistant to marine borers. Difficult to impregnate.

Timber processing:

Drying: kiln schedule G. Silverballi air dries well with little degrade.
Working: saws well and works easily.
Assembly: holds nails, screws and glue well.
Finishing: Finishes smoothly unless grain is severely interlocked. Paints well.

Uses:

'Hard' Silverballi: General carpentry, boat building (planking), suitable for both interior and exterior work in house building; furniture and cabinet work; suitable for veneer and plywood.

'Soft' Silverballi: general carpentry, interior work, light furniture; suitable for utility plywood.

Supplies:

Occurs frequently in the Guyana forests. Regular supplies are available for orders placed in the Silverballi group.

7. Simarupa

- Scientific name: Simaruba amara (family: Simarubaceae)
- A.T.I.B.T. Standard name: Marupa
- Other names: Aceituno, Acajou blanc, Scemardepa, Bitterwood.
- Wood appearance: Heartwood whitish, not differentiated from the whitish or straw coloured sapwood. Wood has a slightly bitter taste, but is odourless. Grain straight. Texture is medium, uniform and lustrous. Bole 70-90 feet long; diameter 20-24 inches.
- Physical and mechanical properties: A very light, soft timber. Weighs about 430 kg/m³ (27 lb/ft³) seasoned. In several respects very similar to Obeche (Triplochiton scleroxylon). Movement small. Low in bending strength stiffness, crushing strength and shock resistance.
- Natural durability: Timber of low durability, blue stains easily. Green converted timber can easily be treated by short dipping and diffusion.
- Timber processing: Drying: dries very rapidly and very well. Kiln schedule L.
Working qualities: Easy to work with both manual and machine tools.
Assembly: glues well. Can be easily nailed with good holding qualities.
Finishing: easy to paint, stain or varnish.
- Uses: Suitable for use where a light, easily worked hardwood is required and where its lack of durability and low strength are not important. Examples are in furniture for interior use, drawer slides, and some types of cabinet framing; interior joinery and shoe heels. Excellent qualities for model making, utility woodware and toy manufacture. Simarupa peels well and makes attractive plywood.
- Supplies: Adequate supplies available in commercial quantities.

Source: Guyana Forestry Commission

3. Properties of a Belizean Timber Species suitable as a substitute to Mahogany in furniture production

Names

Trade: Santa Maria
Botanical: Calophyllum brasiliense var. rekoi Standl. Guttiferae.
Local: Santa Maria, Leche Maria, Jacareuba (Brazil).

Range

Mexico to Brazil and through the West Indies.

Description of Wood:

Sapwood - pale pink, 1-2 inches wide.
Heart - light pinkish to reddish brown.
Odour and taste - not distinctive.
Grain - generally interlocked. Texture - medium.
Growth rings - indistinct, usually limited by a fine line of parenchyma.
Pores - medium, visible, in diagonal to radial chains and in irregular groups, rather numerous.
Vessel lines - distinct, darker than background.
Rays - very fine, invisible to naked eye on cross section; fine but distinct on radial surface, darker than background; faintly visible on tangential.
Gum Veins - often associated with calcium carbonate deposits, rather frequent.
Parenchyma - in concentric or broken tangential lines, indistinct on cross section; distinct because of darker colour than background on longitudinal surfaces, where an irregular pattern is produced.

Physical properties

Density: 540-715 kg/m³ (34-45 lb/ft³) at 15 percent moisture content.
Hardness: moderate, about equal to that of English Oak.
Shrinkage - above average. From green state to about 11 percent moisture content: tangentially 5/8 inch per foot radially 3/8 inch per foot.
Distortion: There is some tendency towards distortion in seasoning unless the logs are suitably converted, preferably by the semi-quartered method. But given this, and careful seasoning, the wood has been observed to give satisfactory results in good class joinery trials over a period of eight years.

Durability:

Resistance to fungal and insect attack moderately high. Heartwood moderately durable in contact with the ground. Constructional material in exposed situations very durable. Not readily

attacked by termite. Not resistant to marine borers.

Resistance to impregnation with preservatives: Sapwood readily amenable to impregnation, but heartwood extremely resistant.

Mechanical properties

In resistance to static bending, shock load and splitting, the timber is slightly superior to English Oak. It has poor bending qualities and cannot be compressed without buckling.

Working qualities

Works with moderate ease in most operations with both hand and power tools and is comparable with medium quality English Oak in resistance to cutting. Sawing: Flat-sawn green wood may cast off the saw. Planing: For the dressing of seasoned stock cutter knives require to be kept in good condition while the rate feed should be relatively low in order to obtain the best results. Unless this care is taken pronounced pick-up may occur in the stripe figure of fully quartered stock, thus causing extra sanding prior to finishing and polishing. If obtainable, a cutting angle of less than 20 degrees materially improves the finished surface. Drilling: The wood tends to tear at the exit hole and the wood must be carefully supported to minimize damage. Turning: readily to a reasonably good finish. Stains and finishes: well but quarter-sawn stock requires much sanding to remove 'picked-up' grain. Nailing: The wood is rather hard to nail and, in dimension stock, nails, once driven, are very difficult to pull. Where the darker coloured gum streaks are present the associated calcium carbonate tends to dull the cutter edges.

Laboratory tests:

- (a) One small log of Santa Maria was tested at Imperial Institute, London in 1922.
- (b) A preliminary test on 5 logs was made at the U.K. Forest Products Research Laboratory in 1932 and a major test on some 1400 cubic feet in 1933.
- (c) Four bolts from different parts of the same tree were tested at Yale School of Forestry in 1932.

Trade trials:

Material from the major test was tried by woodworking firms.

(a)

Veneer and plywood: The interlocked grain persisting throughout the wood caused tearing of rotary cut-stock. Gum streaks were present. Veneers showed a tendency to buckle and in drying the interlocked grain caused splitting both at the ends and middle of the sheets. Plywood showed open end-split, torn grain and gum streaks while distortion was pronounced.

(b)

Plywood: A short log taken from the parcel described in laboratory test (b) above was examined by a firm of decorative veneer manufacturers, who stated that interlocked grain was present and caused tearing of rotary cut veneer, and that gum streaks were present, thus causing a tendency towards splitting and buckling in the veneer when drying. Nevertheless plywood made up from these veneers and kept under observation for some years has remained flat and shows a fairly decorative appearance. For future plywood manufacture care should be taken to select at source logs which are the most suitable in size and shape, and as far as possible free of the defects mentioned.

(c)

Trials as general purpose furniture: A favourable report was made on a parcel of about 500 cubic feet by a furniture manufacturer. The wood was used for turnings, light articles of furniture, small tables, chairs, mattress sides, couches. It was noted that the condition was very fair and comparable with other commercial Empire timbers. Defects and distortion after resawing were not more than 5 percent, which is reasonable. The timber had good 'standing' qualities during manufacture and final assembly.

Source: Notes on Forty-Two Secondary Hardwood Timbers of British Honduras, 1946, Forest Department of British Honduras.

9. Properties of a Dominican Timber Species suitable
for Furniture/Joinery Making

Gommier

Scientific name: Dacryodes excelsa Vahl. D. hexandra (Hamilt. Griseb) (family: Burseraceae)

Other names: Gommier blanc, Gommier montagne (Guadeloupe and Martinique); Tabonuco (Puerto Rico)

Distribution: Gommier occurs in Puerto Rico and the Lesser Antilles, generally in small groups along ridge-tops and upper slopes of the rain forests in Dominica, Saint Lucia, St. Vincent, Grenada, Guadeloupe and St. Kitts.

The tree: Gommier is a large to very large evergreen tree reaching a height of 36.0 m and a diameter of 1.0 m to 1.5 m although mature trees are more commonly 18.0 to 24.0 m tall and 0.5 to 0.75 m in diameter. They are deep rooted, without buttresses, and able to stand up well to the numerous hurricanes of the Caribbean. The boles are straight and well formed.

The timber: Gommier is variously reported to resemble birch (*Betula*, mahogany, and sometimes yellow poplar (*Liriodendron*). It is perhaps closer in appearance to the botanically associated gaboon or okoume (*Aucoumea*), but harder, heavier and much finer textured.

The sapwood is narrow, greyish in colour and not clearly demarcated from the heartwood which is uniform pale brown with a purplish cast when freshly cut, turning a pinkish brown when dried, and a lustrous brown on exposure. The grain is sometimes interlocked, producing an attractive ribbon stripe. The lustre is high and often satiny in appearance. The texture is fine to medium and uniform, and in general is somewhat finer textured than mahogany.

The wood weighs about 640 kg/m³ when dried.

Drying: It dries easily with no appreciable distortion or other defects. Its volumetric

shrinkage from green to oven dry is 10.5 percent; tangentially it is 6.4 percent and radially 4.1 percent, which is superior in terms of drying to those values for African and Honduran mahogany.

Durability: moderate.

Working qualities:

The timber is easy to work but with a tendency to dull cutting edges due to the high silica content of the wood. When sharp cutting edges are maintained, the wood finishes smoothly and takes glue and all finishes effectively. It is good wood for turning and for holding nails.

Uses:

Gommier is used extensively in the Caribbean area for furniture and cabinet making, and in Puerto Rico is often stained and sold as 'mahogany'. It is also used for boat-building, shingles and crates. In the Caribbean, it is considered very susceptible to termite attack, and for exacting purposes not as good as mahogany with its known resistance to termites. Gommier also produces very good veneer. Tests made at the Centre Technique du Bois indicate that gommier is suitable for plywood, with selected stock suitable for decorative veneer. This was substantiated by other tests carried out in Canada with the recommendation that eccentric peeling produced better quality veneer.

Exporting Contacts

Guyana

Mr. H. E. Cort, Marketing Manager, Guyana Forestry Commission, 1 Water Street, Kingston, Georgetown, Guyana, Telex: 2262 WALABA GY, Tel.: 02-54191

Belize

Mr. H. Flower, Chief Forest Officer, Forestry Department, Ministry of Natural Resources, P. O. Box 148, Belmopan, Belize, Telex: 102 FOREIGN BZE, Telephone: (08) 2415

Dominica

Mr. E. W. B. Jerome, Manager, North Eastern Timbers Sawmill Palm Tree-Woodford Hill, Dominica Tel.: 809-449-7042

Mr. D. Southwell, Managing Director, Dominica Timbers Ltd. Sawmill (Portsmouth), P. O. Box 198, Roseau, Dominica

ANNEX III

Draft Project Document

Country: Barbados

Title of project: Assistance to the Barbados Furniture Trading Company (BFTC) in setting up a tool maintenance servicing centre.

Company address and contact: Barbados Furniture Trading Co. Ltd., P.O.Box 478, Spring Garden Highway, St. Michael (Mr. Oriel Forde, Manager)

Government implementing Agency: Barbados Industrial Development Corporation

Executing Agency: United Nations Industrial Development Organization (UNIDO)

Duration: 3 months

Estimated starting date:

External inputs US\$ 25,000

Government inputs In kind.

PART I - LEGAL CONTEXT

To be indicated in the final project document.

PART II - THE PROJECT

PART II A - Development Objective

To promote the operative efficiency of the furniture and joinry industry in Barbados

PART II B - Immediate Objective

To enable the Barbados Furniure Trading Company Ltd. to acquire the necessary know-how for providing tool maintenance services to the Barbados furniture and joinery industry.

PART II C - Background and justification

The furniture industry in Barbados consists of a large number of small workshops and a few medium size plants. Mechanized manufacturers are estimated to be around 70. The output of the furniture manufacturing sector in 1985 was estimated at about BDS\$ 18.5 million (US\$ 9 million).

The emerging of the larger furniture manufacturing plants in Barbados had been favoured by the considerable export opportunities provided by the Trinidad and Tobago market during the oil boom period. In 1983 a record US\$ 5.8 million worth of furniture was exported from Barbados to Trinidad. This amount dropped, however, to US\$ 0.6 million by 1985 due to the intervening oil-revenue slump in Trinidad.

Considerable efforts are now being made by both the furniture industry and the government departments concerned to increase the operative efficiency of the sector so as to redirect exports towards extra CARICOM destinations and in particular the USA market. One of the main constraints to overcome in this respect is the lack of appropriate tool maintenance methods in the woodworking industry as a whole, resulting in greatly reduced serviceable life of expensive, imported cutting tools and preventing a higher quality standard in wood processing to be attained.

This project proposes to help introduce centralized tool maintenance services for the benefit of the furniture/joinery industry as a whole.

PART III D - Outputs

1. The tool maintenance equipment purchased for the tool maintenance servicing centre commissioned and operational; and
2. Three technicians trained in the operation of the equipment.

PART II E - Activities

1. Preparation of plant layout of the Maintenance Centre;
2. Supervision of the installation and trial operation of the equipment.

3. Calculation of appropriate servicing charges for standard maintenance work;
4. setting up a simplified costing system to monitor the Centre's expenditure and income; and
5. Training in the operation of the equipment in the process of providing maintenance services.

PART II F - Inputs

	<u>man/months</u>	<u>US\$</u>
1. <u>External inputs</u>		
11-01 Tool maintenance expert (split mission)	3	24.000
51-00 Miscellaneous expenses		1.000
Total external inputs		25.000
2. <u>Government inputs</u>		
2.1 Local transport		p. m.
2.2 Secretarial services		p. m.
2.3 Counterparts		p. m.
3. <u>Inputs by Barbados Furniture Trading Co.</u>		
Cost of the tool maintenance equipment		
Cost of auxilliary equipment consumed		

PART II G - Related activities

Selection of tool maintenance equipment

The selection of the equipment is provided in the ad hoc report prepared under the UNIDO project UC/CAR/86/201 and entitled: "Guidelines on the selection of woodworking equipment for the small scale furniture/joinery industry in the Caribbean Community" (report reference No. IO/R.53).

Prior obligations

The equipment must be purchased before the final approval of this technical assistance project.