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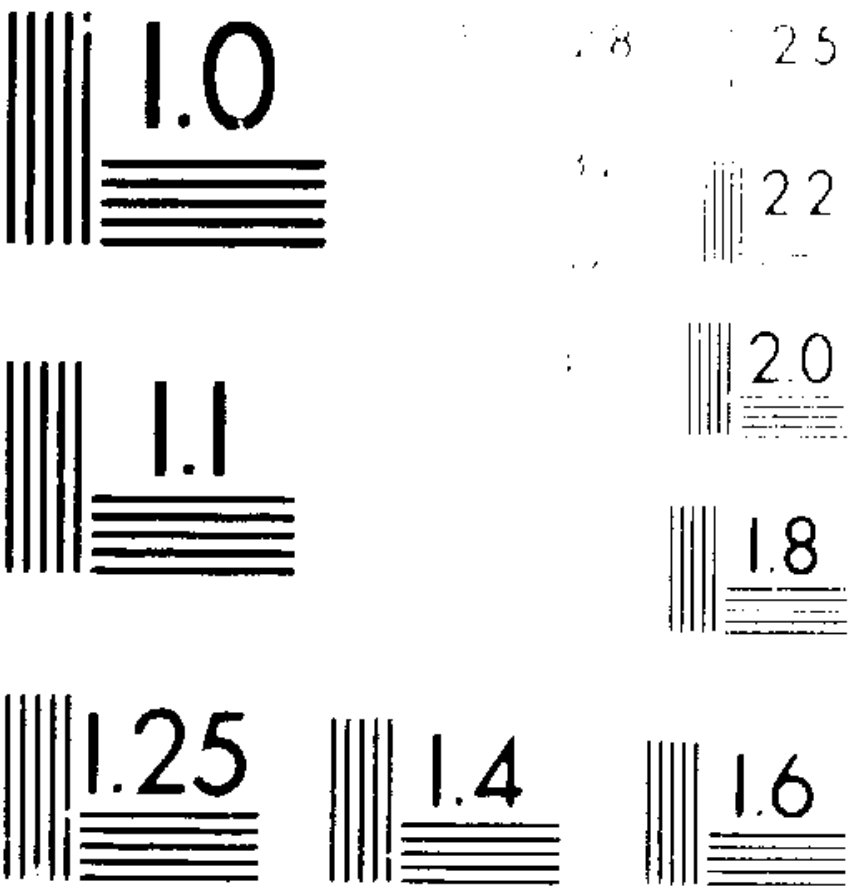
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Guyana.

SURVEY OF, AND TECHNICAL ASSISTANCE TO THE FURNITURE INDUSTRY

SI/GUY/84/801

GUYANA

Terminal report *

Prepared for the Government of Guyana
by the United Nations Industrial Development Organisation,
acting as executing agency for the United Nations Development Program

Based on the work of Desmond Cody,
Consultant in furniture and wood industry

United Nations Industrial Development Organization
Vienna

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Notes

Reference to dollars are to United States dollars unless otherwise stated.

The monetary unit in Guyana is the Guyanese dollar (G$). During the period covered by this report the value of the Guyanese dollar in relation to the United States dollar was $1 = G$. 4.30

The follcwing abbreviations and symbols are used in this report:

B.S.I	British Standards Institute
CKD	Completely knock down
Caricom	Caribbean Common Market
DIY	Do it yourself
F.A.O	Food and Agriculture Organization of the United Nations
F.P.R.L	Forest Products Research Laboratories
F.I.R.A	Furniture Industry Research Association
I.T.C	International Trade Centre (UNCTAD/GATT)
T.R.A.D.A	Timber Research and Development Association.

Abstract

This report contains a detailed description of the Guyanese furniture and woodworking industry together with an assessment of its potential. It also sets out the criteria by which it should be developed in the future with particular reference to exports. Further technical assistance is recommended with the help of international agencies such as UNIDO and ITC.

Problem areas and shortcomings are identified which, unless they are dealt with as a matter of urgency, will continue to inhibit the rational and orderly growth of the industry in relation to both domestic and export markets. These refer in particular to product design, marketing and production management expertise, raw materials procurement, production technology, manufacturing facilities, productivity, standard specifications and quality control.

Reference is also made to the urgent need for formal industrial and marketing training and research and development.

The recommendations arrived at in respect of the foregoing are incorporated in the text and are also summarized in the chapter dealing with conclusions and recommendations.

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INTRODUCTION

Guyana has a wide stretch of tropical forest which covers about 70,000 square miles or 84% of its total surface area of roughly 83,000 square miles. Along the coast, the average rainfall ranges from 80 to 100 inches during two main wet seasons, April to August and November to January, whereas in the south-west savannahs precipitation is sometimes as low as 60 inches mainly between April and September.

In spite of this valuable resource, the forests of Guyana still play a very minor role in the economy of the Country. Main products are roundwood, sawn logs, veneer logs and sawn wood. In 1981 total production was estimated at 637,000 cubic metres of which approximately 12% was exported for a total of US $9.8 million (FAO estimates). In 1980 the timber industry's contribution to Gross National Product was approximately 2.5% and over the period 1974-1978, exports provided 3.5% of the foreign exchange earnings. No statistics exist on production and foreign trade of furniture, joinery and other manufactured wood products.

Sugar, rice and bauxite/alumina have been the backbone of the Guyanese economy. These commodities are, however, subject to factors such as fluctuations of prices and demand on world markets which in the context of the current world recession have seriously weakened the balance of payments. This has introduced further rigidities into the economic system thus making it extremely difficult to restructure it effectively. Since all other sectors of the economy depend for their input requirements on its external performance, this has further exacerbated the situation.

As part of a strategy to assist in re-habilitating the economy the Guyanese Government has introduced a number of economic recovery policies, one of which is the processing of secondary products in order to add further value to Guyana's exportable resources. Among the industries thus identified is the manufacture of furniture, joinery and other wood products. The basic raw material for this industry, namely hardwood, is domestically available and given the appropriate and necessary investment in equipment and technology, could become a reliable foreign exchange earner in its own right, as well as boosting the earning capability of raw timber which has recently been weakened on world markets.

The mission of the consultant was to assess the current state of development of the industry and to provide short and long term recommendations for its development. The project lasted approximately two months over October 1984 and January 1985, during which time a survey of the industry was carried out, some ad hoc consultancy was provided at individual plant level and discussions were held with relevant Government and manufacturers organizations, particularly the Guyana Manufacturers Association Ltd. The consultant's job description is given in Annex 1. Details of the survey questionnaire and a summary of the findings are given in Annex 2.

Guyana Forestry Commission's Forest Industries Development Unit was assigned to be the counterpart to the consultant and its works Manager,

Mr Clayton Hall, carried out all the survey field work, arranged visits to organizations and enterprises and accompanied the consultant to each.

The enterprises and other organizations that co-operated with the consultant in his field of work or participated in the project are listed in Annex 3.

Towards the end of his mission, the consultant presented his findings at a meeting of all participating furniture and wood processing manufacturers and other interested organizations. The meeting was organized by the Guyana Manufacturers Association Ltd and was held in the Park Hotel, Georgetown on 30th January 1985.

FINDINGS

A. General observations

While no official statistics concerning the Guyanese furniture and woodworking industry exist, it is evident that it has a fairly broad base. Much of this however is accounted for by a multiplicity of small workshops estimated at around 200 which are scattered throughout the country and which cater for local community needs. In these handwork predominates.

In addition, there are about twenty or so larger workshops or factories and these are to be found in or around the urban areas especially Georgetown, which has by far the highest proportion.

Guyana's history as an important source of tropical hardwood for international markets has ensured the development of the logging and sawmilling sector. This in turn generated interest in further timber processing and thus there emerged the woodworking and furniture manufacturing sectors which are now catering to a growing local market while making tentative preparations for possible sales in the Caricom area ultimately in the major markets of the United States and Europe.

Based on all available data including, in particular, the returns of the recent survey and visits made by the consultant to individual plants it would appear that the structure of the industry within the factory-type enterprises is as follows.

1.	Number of factories	21
2.	Total Capital Invested	3.75 M.
3.	Number of employees, production	709
4.	Number of employees, Administration	45
5.	Total sales (1984), domestic, (estimated) G$	10 M.
6.	Total sales (1984), export, (estimated) G$	0.9 M.

As may be seen from above the bulk of products is sold locally. Annual average sales for both local and export markets excluding the output of the large number of small workshops is estimated at G$ 10 Million, with an export component of about 9 percent.

There are a small number of retail outlets in Georgetown but most furniture items are sold directly to the public by the manufacturers, who custom-build them to individual customer specifications. There is very little series production despite the availability of modern machinery and equipment in quite a few plants. Joinery i.e. doors, windows and staircases are made almost

exclusively by builders in their own adjoining workshops and there are manufacturers specializing in the production of timber-framed housing, a little of which is exported to neighbouring islands, particularly Trinidad and Tobago. Prices of finished wood products including furniture tend to be high even by Guyanese standards and delivery in many instances may take anything from two weeks to six months.

A very high percentage of the furniture made derives from designs where the use of solid wood predominates. These designs in their original form are noted for their proportion, elegant styling and attention to detail. They are therefore difficult to reproduce successfully and require an intimate knowledge of the working characteristics of wood allied to mechanical and manual skills which are both highly developed and artistic. Of the many pieces of furniture examined by the consultant few, if any, could be rated highly enough to warrant acceptance in export markets. Most are crudely executed, lack proportion in detail, are poorly finished and clearly demonstrate that their producers have little knowledge or experience in either the design or detailing of such pieces and have even less experience of fine craftsmanship in their execution.

The industry for the most part is reasonably housed and equipped and it is evident that a determined effort was made over the years by many producers to provide themselves with appropriate manufacturing facilities. That they did not altogether succeed is perhaps due more to their lack of knowledge of what constitutes present day wood manufacturing and this undoubtedly led in many instances to the wrong choice of particular machines for particular purposes. Nevertheless, this is not invariably the case and at least five or six companies are fairly close to being sufficiently well equipped to think seriously about exports.

Factors that have contributed to the generally unsatisfactory state of the industry include its relative ignorance of and isolation from up-to-date technological developments, a lack of detailed knowledge of or expertise in furniture design and quality standards, a continuing low level of investment brought about by the current poor economic climate, untrained and inexperienced management particularly on the technical side, no supporting service in product design and development, grave difficulties in obtaining essential raw materials which are not only scarce but also very expensive, low productivity, little or no knowledge of foreign markets and no understanding of marketing or its functions in relation to their products.

Very few firms appear to be financially strong and there is a serious shortage of working capital. Some firms, having taken years to build their factories and equip themselves for production, find that they still cannot obtain power-supply or because the foreign exchange essential for the purchase of spares and accessories is simply not available. Similar shortages for local transport of raw materials are a further constraint and management of individual enterprises is often required to spend an inordinate amount of time foraging around for alternative ways and means of overcoming these difficulties.

These and other factors concerned with the development of the industry are dealt with in some detail in ensuing chapters.

B. Product design and development

The question of design is so fundamental especially to the furniture industry that it would be difficult to exaggerate its importance. Not only must the end product be pleasing to the eye but it must also make the most economical use of the materials and production facilities available and be, at the same time, technically, ergonomically and aesthetically satisfying.

Looked at in this way, it is evident that most Guyanese furniture producers lack any real understanding of the place and function of design in relation to their products. Design, where it is given any attention, is thought of exclusively in visual terms as something to be added to or substracted from the final appearance of the product in order to distinguish it. Even in the case of solid wood furniture, a product sector to which the industry gives a lot of attention, it is evident that the production of particular styles is without any understanding of the original work.

The results of not taking into account the production facilities, inclusing the levels of management and operative skills of individual firms are obvious. Pre-occupation with imitation of a competitors product or design ideas based on indiscriminate use of foreign manufacturers catalogues have forced some manufacturers into producing types of furniture for which neither their premises, their machinery, nor their workers are suited. Inevitably they end up making inferior imitations of an already imitated product with further deterioration of quality as a result.

Furthermore, there is a widespread lack of understanding of the nature and characteristics of the materials used. If we examine furniture of the past made from solid wood by the old designer craftsman, we find that he was necessarily made aware, by the variations and differences of the material, of its nature and the different problems of form, manufacture and ultimate shape which it posed. This is equally true of present day production since design essentially rests on knowledge of materials and the way they are used to the best advantage in furniture production. These aspects have been largely neglected in Guyana.

It is therefore imperative that ways and means be found of raising the general standard of design in the industry and this is a matter to which individual firms must give immediate attention. Good design is not only essential for exports but is equally important in developing a worthwhile home market A realistic beginning could be made by producers themselves acknowledging that they are not designers and that if, for example, they wish to accurately reproduce established designs, then they must go back to the source of such designs. This information is readily available in the many books published on the subject which usually incorporate detailed dimensioned drawings which leave no room for error.

Since there are no furniture designers in Guyana, assistance should be sought, possibly with the co-operation of international agencies, in obtaining the services of internationally recognised furniture design consultants who would advise and assist the industry in the development of its product design particularly for export. This recommendation is further elaborated upon in the chapter dealing with follow-up action.

Design styling

The exact nature of any design programme should be a matter for each individual company, decided upon in the light of the factors already referred to and, most importantly, in response to specific market requirements.

Having regard to the fact that the emphasis will be placed primarily on indigenous materials, the production of solid wood items must predominate. The consultant therefore considers that the greatest potential lies in the production of furniture and/or components which are characteristic of the following established American and European styling.

Early American;

Eighteenth Century;

Regency

Queen Anne.

These styles continue to enjoy universal appeal, they lend themselves to production in crabwood, are noted for their inherent value, and may be manufactured in a completely knock-down form (CKD). There is also good potential for the production of a range of well designed dining-room and occasional furniture which incorporates many of the characteristics of the above-mentioned styles but which are adapted to the less spacious living conditions of our age. These would also be made in the popular Guyanese hardwoods such as Determa, Locust, Hububalli and Kabukalli. Sketches of these designs and some desirable additional design recommendations are included in Annex 4.

In general, the consultant feels that the export markets for modern or contemporary furniture would be more difficult to penetrate than for traditionally styled furniture. This is because long established competition from Scandinavian and Eastern European countries as well as a good domestic manufacturing situation already exists in these markets.

C. Manufacturing facilities

1. Buildings

Most manufacturers have reasonably spacious, well-ventilated buildings which are conducive to a good working enviroment. Even those who have not such buildings seem determined to obtain them at the first opportunity and are actively seeking new sites and buildings.

The siting of machines appears to be decided by the order of purchase rather than by production demands: in only a few factories was there apparent any systematic organization of the processes in logical order in accordance with the sequence of operations. Work study is practised by only one firm. It is quite common to find material being brought up or down or across the factory for succeeding processes without any regard for the logical and efficient use of the space available. The result is often a prodigal waste of space in factories where space is at a premium. In many factories more than half the floor area was taken up with sawdust, woodwaste and off-cuts while the management complained of lack of room.

2. Materials handling

A notable feature of almost all factories visited was the absence of devices to aid materials handling. It does not seem to be generally appreciated that the manual handling of materials adds nothing to their value but may add considerably to their cost. Skilled workers spend much of their time simply lifting, stooping or carrying pieces of wood about while their machines remain idle. Even firms which employ labour to move materials about the factory floor rarely supply them with labour-saving devices such as castorised pallets or small hand-lift pallet trucks. Figure 1 provides details of suitable equipment for internal transport of raw materials and work-in-progress.

3. Working conditions

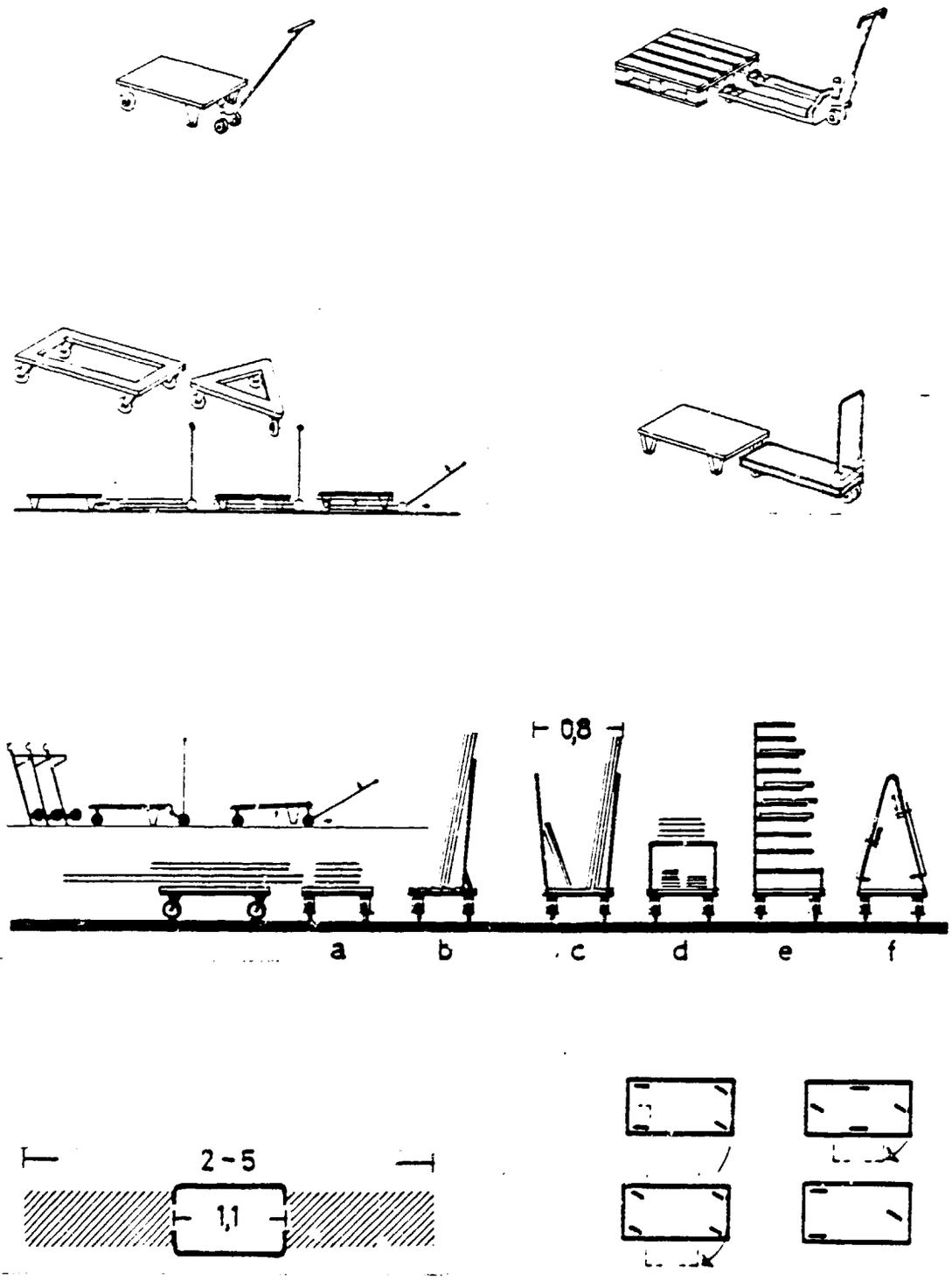
In only a few plants was there a comprehensive dust extraction plant with extensions to every machine. Some had partial dust extraction. The simple expedient of painting white lines to indicate passageways to be left clear for the transport of materials was seen in only one factory. Lighting in most factories was not good and this could easily be improved by providing external roof lighting by replacing some of the existing roofing with translucent panels.

From the general lack of attention paid to these factors, it seems evident that management do not appreciate that they can affect considerably not only the comfort of the workers but also output and profits.

4. Plant and equipment

Most factories have basic woodworking machinery and equipment which is suitable for the limited processing of hardwoods for furniture. For some, this means little more than an extension of handwork, while for others it may mean a semi-mechanized system of production which maintains considerable reliance on individual skills and judgements. Even those which are reasonably well equipped do not fully utilise the potential thus offered, partly from inexperience of such production methods and partly because of the widespread practice of custom-building individual items of furniture.

Figure 1.



Internal Manual Transport System

Of the 20 factories visited, only 6 could be regarded as being adequately mechanized for the kind of production envisaged for successful exporting. It is, significant that only one of those six has so far made any worthwhile inroads on foreign markets.

If the industry's equipment needs are related to its existing and potential markets both at home and abroad, it will be seen that selection should be on the basis of a fairly wide range of solid wood models and timber species with reasonably high volume or batch production, manufacture by order, with competition based on excellence of design and quality execution of products. This means that the major role is still played by fairly straightforward machinery capable of achieving a high degree of accuracy, of being adopted easily for the number of different operations required, where the human elemnet is of considerable importance.

Annex 5 gives an outline of plant and equipment required for a solid wood furniture factory, excluding a timber-drying kiln. The machines chosen are particularly suitable for a very diversified and flexible production and when properly set up and supplemented with suitable jigs and formers are simple to operate. Total investment for technical assets could be around US$ 300,000 and with 100 workers would mean an investment per employee of US$ 3,000.

Reference should also be made to the importance of machine setting up and maintenance and the ready availability of appropriate spares and accessories. At present the situation is a nightmare for Guyanese manufacturers attempting to maintain a reasonable rate of production and profitability. Import licenses and the relevant foreign exchange currency are becoming more and more difficult to obtain and should this situation continue indefinitely it will certainly result in innumerable shut-downs, if not closures, and add further to the already rapidly mounting idle capacity in the industry. Recommendations regarding the provision and establishment of common machine tool and maintenance facilities are referred to in the chapter dealing with follow-up action and detailed in Annex 6.

5. Timber drying

Previous reports concerned with the development of the furniture industry have rightly emphasised the importance of the proper drying of timber. This is a field in which co-operation by the industry would pay immense dividends. Timber drying kilns are expensive items of equipment, require considerable skill to operate successfully and are beyond the resources of most Guyanese manufacturers. A central drying station run in co-operation by or for the industry could reach the maximum economies of continuous operation, guarantee a steady supply of properly-dried timber and relieve the manufacturers of the physical and financial burden of carrying large stocks of undried timbers. This matter is also dealt with in the chapter dealing with follow-up action and will be the subject of a special UNIDO mission in the near future.

D. Raw materials

In the furniture industry raw materials can account for as much as 50 to 60 percent of the total costs of production and are therefore of paramount importance in both design and production considerations, whether the end product is sold on domestic or export markets. Attention is focused on those which give the industry most concern, namely, solid wood, adhesives, lacquers and hardware.

1. Solid wood

Despite large forest reserves, supplies of suitable timber, especially crabwood, hububalli and kabukalli for furniture are scarce, erratic and expensive. This is because sawmillers are reluctant to supply local users with prime material preferring to sell it to export markets. Even when the material becomes available at the sawmills it is seldom in the form or dimensions needed by the furniture manufacturers and its subsequent conversion occasions considerable waste. Finally there are transport problems. The sawmills are often far from the furniture factories and since invariably the latter must provide their own transport to ship the material, the absence of spares, tyres and fuel for their trucks render this impossible.

This is a very serious matter especially for existing or potential exporters of furniture and other wood-based products and the adviser urges the Forestry Commission to give immediate and urgent attention to the establishment and maintenance of a satisfactory supply situation.

Attention should also be given, especially by the Guyana Forestry Commission to the important matter of identifying and introducing to the trade both at home and abroad alternative timber species which could be used commercially and which would help to ease the current scarce supply situation. Discussions with sawmillers and furniture producers reveal that there are many such species available particularly the following: silverballi, tauroniro, locust, mora and determa. It should be borne in mind that many of the well-known and highly desired species such as crabwood, hububalli and kabukalli were themselves relatively unknown and untried some years ago. When eventually these have been identified and tested, particularly in collaboration with for example the Timber Research and Development Association (T.R.A.D.A.) of the United Kingdom, an organization highly respected in this field throughout the world, assistance will also be required in promoting them at consumer level.

Price levels for these and all other species will also play a vital role in establishing a strategy for the development of furniture for exports. In the past year or so the prices of many of these species, because of their scarcity value and the effect of rapid domestic inflation have increased considerably so that there is grave danger in their being priced out of the market either as raw materials or finished products. Somehow both the supply situation and prices must be effectively controlled.

2. Adhesives, lacquers and hardware

These materials are as essential to the raw materials needs of the industry as is timber and without them there is no future for the export of semi or fully finished furniture, much less the development of a worthwhile domestic market and the provision of much needed employment. These essential materials are not available to a suitable standard in Guyana nor is there any likelihood of this being so in the forseeable future. Therefore, their duty-free importation should be permitted if the industry is to develop as it should.

Similar observations apply in respect of other materials such as fittings and accessories, i.e. knock-down metal fittings, hinges, handles and locks, as well as materials like sand-paper, screws, nails and panel pins. If these are bought on the open market, as many furniture manufacturers are obliged to, they pay anything from four to six times the prices they would have to pay in Europe for similar items.

If the Guyanese furniture and woodworking industry is to grow and prosper both on home and export markets, then all such anomalies and artificial obstacles standing in the way of progress should be removed without delay. This should begin by liberalising the importation of these materials through the issuing of import licences, the availability of which being related to the industries specific needs particularly for exports. Otherwise it has little future.

E. Production

1. Output

The output of the wood furniture sector of the industry may be divided into seven classes: cabinets for living-room, dining-room and kitchen, tables, dining-room chairs, upholstered goods and occasional furniture. All this may suggest that specialization is a feature of the industry. This is true in only a very limited sense. Within each class of goods there is an extremely wide range of articles and most firms produce an almost endless variety of models. The vast majority of firms do not specialize to any particular extent: most of them are prepared to undertake the manufacture of any piece of furniture within their competence or request.

Very few firms have been notably successful in reducing the number and variety of articles produced. There may be a number of subsidiary reasons for this - lack of financial resources, anxiety to make maximum possible use of idle capacity, versatility of workers and machinery - but the principle causes are lack of a distinctive product and the dominating influence of the practice of custom-building furniture. These interact on each other, for firms without a distinctive product are susceptible to demands to produce a competitor's product more cheaply while the knowledge that its features would be pirated, possibly in inferior materials, discourages a firm from producing a distinctive product. The result has been largely a case of the bad driving out the good, exacerbated by the almost total insulation of the home market from outside

influences. The adviser has no hesitation in stating that the poverty of design, itself due to a combination of factors, has been in large measure the cause of the industry's production problems.

2. Fluctuations in production

Flow production is unknown in the furniture industry. Even batch production is the exception rather than the rule even in the largest factories. Where it does exist the batch sizes quoted range from 6 to 100, but a more representative range of sizes commonly used in the industry would be from 12 to 50 units. This is little removed from a four or five man workshop. The largest factories will also fulfil special orders.

The size of orders varies considerably, but large orders are virtually confined to contract jobs for hotels, institutions or government agencies. Since there are very few retailers, their orders are rarely large and manufacturers are regularly called upon to supply single articles or single sets or suites of articles. The result is that manufacturers, if they do produce for stock, are forced to carry the finished goods; wholesaling in furniture is almost unknown in Guyana. Practically no manufacturer considers he is in a position to insist on minmum order sizes. The necessity for manufacturers to stock the finished goods, together with their chronic shortage of working capital alluded to earlier, puts them under constant pressure to keep manufacturing batch sizes down to the minimum consistent with quick turnover. The smaller batch sizes in turn push up costs.

3. Costs

It is difficult enough to get reliable costing of production in any industry, especially for the purposes of inter-firm or international comparison. It is doubly so in the furniture industry, where any form of costing other than the crudest job costing is the exception rather than the rule. The costing systems that exist in many firms were devised by the owners and can hardly be said to have scientific basis.

Based on data collected by the consultant during the course of his investigation of the industry it would appear that productivity i.e. output value per worker per year, ranged from a low of US$2,000 to a high of US$5,000.

The consultant considers it important to make this point, for many Guyanese manufacturers regard labour productivity as merely a matter of the workers producing more, without realising that good factory building, efficient plant layout and informed management are necessary to make it possible.

4. Production technology

Production of wood products derives from a set sequence of operations (see figure 2) which is invariably followed from factory to factory, and alters

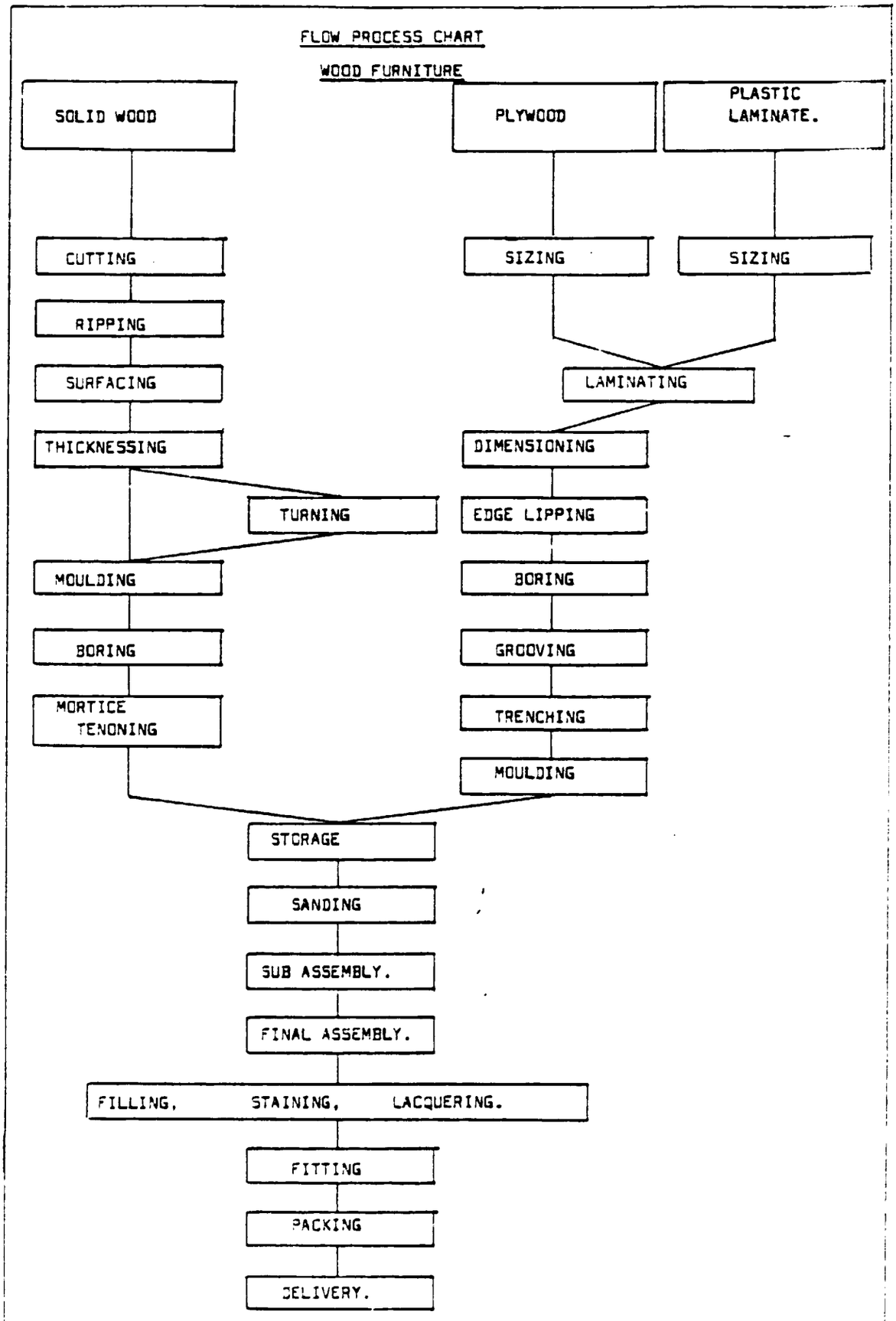

FLOW PROCESS CHART
WOOD FURNITURE
SOLID WOOD
PLYWOOD
PLASTIC LAMINATE.
CUTTING
SIZING
SIZING
RIPPING
SURFACING
LAMINATING
THICKNESSING
DIMENSIONING
TURNING
EDGE LIPPING
MOULDING
BORING
BORING
GROOVING
MORTICE TENONING
TRENCHING
MOULDING
STORAGE
SANDING
SUB ASSEMBLY.
FINAL ASSEMBLY.
FILLING, STAINING, LACQUERING.
FITTING
PACKING
DELIVERY.

FIGURE 2.

only in detail in accordance with specific design considerations. The technology is well-known and highly developed and relates specifically to the nature and quality of the materials used, the methods of construction, finishing (i.e. polishing) and where appropriate, upholstering.

5. Solid wood processing

In the case of furniture production, the equipment to be used as a means of achieving this technology , although constantly being refined and its capacity increased, has altered hardly at all over the years. As has been emphasized already, much of it is no more than a mechanical extension of otherwise manual processes, but it provides the opportunity, at a relatively low cost, of achieving a desired level of accuracy as well as productivity. Thus it may be regarded as an essential ingredient of production and naturally would be of a more sophisticated and productive nature in a factory situation. To this must be added the manipulative and machining skills of the operatives, neither of which can be achieved without training and knowledge.

These are minimum requirements and it was clear to the consultant that in many of the factories he visited their part absence was reflected in the poor design and poor quality of the end products. Many factory owners aspire to export their products but they must realise that without radical change in their whole approach to manufacturing and without a dramatic improvement in standards of construction and finish such hopes must remain stillborn.

6. Production reorganization

The consultant therefore recommends a radical overhaul of the industry's current technological base with a view to modernising and adapting it for up-to-date production. The deceptive simplicity of the various processes should provide a challenge for the technically qualified production manager which, when overcome, will undoubtedly pay handsome dividends for the industry. This should begin with an assessment of the product itself, its overall design, its raw material input, the methods of processing each component, the means used for joining those components, their individual and collective rigidity, procedures for sub and final assembly and finishing systems. Other aspects which also require attention are the extent to which each product, especially seating, is dimensionally accurate and performs satisfactorily.

7. Prototyping

In this connection each factory should set aside a small section for prototyping and product development where this essential activity can be carried out without interfering with normal production. It should be staffed with the most skilled workers available and no model should be manufactured in series until all production difficulties have been ironed out and all production aids have been perfected. This would also pre-suppose a high degree of standardization of parts for each range of models and, it is worth noting, that this is the function of the skilled furniture designer who, as well as being the expert judge of shape, character, and colour, and the fount of inspiration for new creative ideas, has also a sound knowledge of materials, economics and production techniques. Only when this essential "homework" is satisfactorily completed can effective production be planned for.

F. Management and labour

1. Management

In order to attain the efficency required for the continued viability of the furniture and other wood-based industries, it will be necessary to improve the technology and the branch knowledge of the industry. A high level of technology and professional knowledge is required at all levels of the industry if it is to operate successfully and produce products of the kind and quality demanded by the market, within the country as well as abroad and at a cost which allows for an acceptable profit. It would be wrong to assume that a high level of academic qualifications is necessary. It is rather the scope and depth of knowledge and the ability to put that knowledge into practice which constitute competence.

There are three aspects of competence which are important to the furniture and wood industry and each one must complement the other in degree of proficiency. They are:

Managerial and Executive

Technical and

Vocational.

At the executive level, the basic skill required is the ability to organize, control and make decisions. This involves matters of product policy, finance and marketing as they are to be applied to daily routine matters of administration and production. Technical knowledge is also essential at this level to ensure that such problems are thoroughly understood and dealt with in a practical manner.

At this juncture it is necessary to emphasize the importance of understanding the financial implications of activities at factory floor level. While managers need not be experienced accountants they, nevertheless, should have a working knowledge of costing and cost control and be able to read cost accounts so that they can correctly judge efficiency and economy of choice of methods and products.

Trained and qualified junior levels of management, namely supervisors, technicians and foremen, are almost completely lacking in the Guyanese furniture and woodworking industry. This is because there is a reluctance at all levels of management to delegate responsibility and authority to lower levels and there appears to be a reluctance among production personnel to accept such responsibility.

Neither of these reasons, however, are acceptable for allowing a vacuum in the management structure of any reasonable-sized enterprise. As it is now, problems which are encountered in production are left to employees to overcome and top management is seldom aware that they even exist.

Furthermore, it is necessary to continuously see that orders and instructions are being implemented, that problems and bottlenecks are anticipated and action taken to ensure an even flow of acceptable quality products; this can best and sometimes only be done by competent factory floor supervisors and technicians.

This section of management must have the technical expertise of machine setting up and operation, detailed knowledge of production standards and an ability to obtain, from a group of employees, a work effort which will produce desired results.

Almost all managers in the industry are too heavily production oriented. Too often there is a pre-occupation with the present and very few had philosophy for the long-term. There is no doubt that such attitudes were born and fostered through the continued isolation and protection of a small home market. They manifest themselves in a lack of management skills, particularly of analysis and decision-making and a complacency with regard to the need to make improvements in performance. Part of the reason for this problem is the lack of formal training on the part of many managers in the industry at present. Unless this matter is tackled urgently, the consultant sees little worthwhile future for the industry especially in relation to exports.

Accordingly, he strongly recommends, as an immediate follow-up to the current project or as part of it, that in conjuntion with international co-operation a special course of two weeks duration be organised in production technology and woodworking industry management. This should be attended only by owners, managers, and other supervisory levels of management in each factory. The course should be run on the basis of lecture sessions and the practical application of the principles of production and administrative management in each of the participating factories. The course need not necessarily be confined to Guyanese personnel but would also be of benefit to participants from other caricom countries where it is felt such training is also necessary. This matter is referred to again in the chapter dealing with follow-up action.

The syllabus for this course should have appropriate emphasis placed on the following:

(a) Plant layout and design: problems in industrial plant design as applied to furniture and joinery manufacturing, building structures, equipment location, space utilisation, power utilisation, light, heat, ventilation and safety, materials handling, maintenance.

(b) Woodworking equipment: study of production woodworking equipment for cutting, shaping, sanding, veneering and assembly operations; capabilities and limitations of machines, theory and practice of cutting and sanding wood, low cost mechanisation, pneumatics, electrics and hydraulics.

(c) Wood processes: processes of drying, glueing and finishing wood; reconstituting wood as hardboard and particle board.

(d) Engineering economy: study of criteria and techniques for management decisions in relation to economy of design, selection, and operation; effects of depreciation policies and machine replacement.

(e) Furniture design and construction: detailed drawings and bills of materials from samples and designer's sketches. In construction, emphasis should be placed upon good performance under varying atmospheric moisture conditions, adequate strength and rigidity, and low cost.

(f) Furniture manufacturing and processing: study of production methods in the furniture industry, including production procedures from the timber yard through all operations, packaging and dispatch.

(g) Manufacturing controls: development of principal procedures and documentation for control of materials, manpower and costs with special attention to production and inventory control, equipment utilisation, work study, wage classification and cost reduction programme.

(h) Quality control: economic balance between cost of quality and value of quality. Statistical theory and analysis as applied to sampling, control charts, tolerance determination, acceptance procedures and control of production.

2. Supervision

Many references have already been made to the need for informed and sustained supervision of the work force. This is a particular requisite for good productivity and there is no substitute for it. Again it requires training in human relations, work allocation and quality control. Above all, it calls for personal qualities of leadership which will win and sustain the loyalty and respect of the workers, and encourage them to learn and to give of their best. It should be manifest in fair-mindedness and a careful observance of individual plant regulations whether concerned with discipline, punctuality or productivity.

3. Labour

The adviser is satisfied that local Guyanese labour can be productive and can perform most operations at satisfactory quality standards provided that it is properly trained, instructed and supervised and that the technical management is equally competent.

Most exports for the foreseeable future will be concerned with subcontracting in one form or another i.e. components made to customer-specifications and designs. This can only be done by concentrating on very large production runs which in turn means the design and widespread use of jigs, templates and other checking devices. These are the circumstances in which Guyanese labour will perform most satisfactorily because technical and quality decisions are not left to their individual judgements.

The cost of labour is much lower than in Europe and the United States and, as a consequence, this would be expected to be reflected in lower manufacturing and selling costs. This, however, is far from the case as the accompanying productivity is not being achieved. One of the main reasons is that daily wage rates for a skilled worker seldom exceeds 3.00 U.S. Dollars. In Thailand, the Philippines and Indonesia, for example, it is possible to pay U.S.$1.00 for 100 minutes of work, whereas in Guyana this will be up to 150 minutes. Five years ago, despite in the meantime, spiralling inflation, this figure was roughly the same. Thus there is little incentive to produce at an acceptable rate and absenteeism and high labour turnover are a feature of the industry

G. Industrial training

1. Management level

The number of management personnel varies with the size of the operation, the diversity of the production and also with the number of employees. Sometimes one and the same person may be called upon to perform several functions. However three distinct categories of management can be distinguished:

a. Administration - sedentary in nature, requiring knowledge of business practices.

b. Production - manual, requiring knowledge of processing techniques.

c. Machine setting up and maintenance. - manual, requiring knowledge of mechanics, pneumatics and electrics.

d. Sales - sedentary, requiring marketing and market knowledge.

For categories a, b, c, business management, company law, production planning and control, quality control and basic accounting constitute the field in which knowledge is required. The initial training could be obtained at Universities or in specially arranged courses. At present, few such special courses are available in Guyana and no University offers training in these fields with special emphasis on wood-based industries. However, general training as offered by Universities, combined with practical experience and complementary training could serve the same purpose until specialized courses become regularly available. The complementary training could be in the form of seminars and workshops and it is likely that in the initial stage instructors have to be obtained from abroad.

It is essential that the Government through the Ministries of Education, Industry and Forestry, exercises initiative in arranging specialized further training for managers in the woodworking industry, as the industry lacks the cohesion to initiate this activity for itself and probably does not fully appreciate its need.

2. Technical level

The technical or operative category in the woodworking industry can be described as belonging to three major groups:

a) Production technicians, whose task is to develop products to the stage when they can be manufactured in series production and in accordance with quality specifications and projected costs.

b) Machine maintenance technicians, who set-up machines and maintain cutting tools.

c) Operatives, who carry out the tasks of machining, sanding, finishing and, where appropriate, upholstering a wide range of wood-based products.

The basic skills required for categories a and b are a complete understanding of why and how the equipment and other facilities they are concerned with perform in a given manner, an awareness of their limitations, an ability to detect faults and flaws and to take corrective action and an ability to adapt machines and devise additional production aids for particular purposes.

The impression gained when visiting individual plants is that maintenance and preventive repair do not receive adequate attention and often no action is taken until breakdowns occur or cutting edges are so blunt that they no longer can perform. Even lubrication of parts is neglected and electric wiring and components are often left exposed. Sawdoctoring and cutter-grinding receive insufficient attention from management and those responsible for carrying out this work are in many cases self taught and do not, in general, have the skill and experience required for high quality manufacturing.

The need for trained and experienced technicians in all branches of the Guyanese wood-based industry is great and any planned expansion of the industry and its diversification of manufacturing and market emphasis will escalate this need. In this situation it is imperative that appropriate government agencies, as a matter of urgency initate the establishment of technician training courses and expand the technical training facilities. Equally urgent is the need to adopt organized apprenticeship (leading to technician) and learnership training schemes, by the industry, to function as complements to classroom training.

In order to provide for advancement within the industry for technical personnel at least one technical school should offer advanced training courses for technicians who have completed their apprenticeship and gained experience in the trade.

3. Vocational training

All production personnel in the woodworking industry are described as requiring skill. Often the following sub-division of functions by grade or level of skill is used:

	Furniture plant	Joinery plant
Skilled I	Cabinet/Chairmaker *	Joiner *
Skilled II.	Machine Operator	Machine Operator
	Assembler.	Assembler.
	Wood Finisher.	
	Upholsterer.	

* With ability to set up and operate a wide variety of woodworking machines.

The above listing is brief and does not include every type of operator. It is intended to show that there are degrees of skill; for example a spindle moulding machine operator requires more skill than a routing machine operator.

During plant visits many shortcomings in vocational skills were observed. Band saws and circular saws were incorrectly sharpened and tensioned, cutter blades on surfacers, thicknessers and moulders were blunt, resulting in the tearing of wood and clogging of machines, joints were badly fitted leaving unsightly gaps and weak structures, and generally there was a lack of quality consciousness which was only too clearly evident in the end product.

Much of the mechanical functions of machines can be taught by direct instruction. Since however, timber is a natural raw material and no two trees are exactly alike in configuration or quality machine operators should not be permitted or expected to be purely mechanical. They have to acquire skills to assess the material and mentally impose a working pattern on it. This ability can be gained mainly through experience.

The initial training should ideally be a combination of theoretical classroom instruction and "on the job" training. No such training is offered in Guyana to-day. Probably the best solution is that the Forestry Commission accepts the additional responsibility of providing practical training in conjunction with the plants and that government provides the classroom facilities required. Industry on the other hand should employ or accept as trainees students coming out from this basic training and provide them with additional guidance and practical experience.

It should be noted that many existing operatives need upgrading before they can be entrusted with the guidance and instruction of trainees so as to avoid the passing on of poor working habits.

4. Instructors

The training requirements which have been identified in the foregoing are to a great extent new in Guyana. The most difficult problem in implementing them will be the availability of suitable instructors. There is therefore an urgent need to commence instructor training with particular emphasis on some or all of the following:

- Organisation of special instructor training courses with the assistance of international training agencies.
- Provision of overseas training courses in well established training centres.
- Recruitment of qualified and experienced managers and supervisors as part-time instructors and whole-time after retirement.
- Operators with high skill and ability to instruct should be identified and made available to training institutions on a part-time basis.
- Trainees should be sent abroad to work in efficiently-operated plants.
- Manufacturers of equipment should provide special training in respect of the efficient operation of the equipment they supply.

4. Standard specification and quality control

1. Quality control

The ability of a product to compete on a market is directly related to its overall quality and to a lack of variation in that quality. In the furniture and joinery industry there are very many sources of quality variations including the following:

- properties and conditions of timber and other materials;
- dimensional accuracy of machined components;
- dimensional accuracy of partly or fully assembled products;

- quality of surface finishing;
- durability and performance of finished products.

Control of quality implies comparing what is achieved with what is required, seeking the causes of any disparity and taking action. There are two main aspects of control of quality.

(a) Regulating the process to maintain quality;

(b) Adapting the process to achieve new and often higher levels of quality.

The most effective and economical approach is for the skilled craftsmen to control their own quality and to inspect their own work. This is an expression of the management's ability to delegate, i. e. to define what quality is required and provide the conditions necessary for the worker to achieve this standard consistently.

The conditions are:

- the worker needs a clear definition of the quality to be achieved;
- the materials must be to the required specifications;
- the tools and equipment used must be capable of achieving the required quality;
- the worker must possess the necessary skills and ability;
- he must know whether or not he is achieving quality and, if not, be able to adjust the operation or process to achieve it;
- he must be motivated to achieve quality.

It is important to note that these conditions need to be satisfied at each stage of operation in the process whether the worker is machining, assembling, or polishing. Consistent failure to satisfy any one of these will mean that a chronic problem is present.

3. A strategy for quality improvement

The principles and concepts outlined are basic and practical. Together they can form the basis for reviewing and upgrading quality in manufacture by considering the main areas of quality and testing the level of performance, the level of control, identifying the obstacles and defining the role of supervisors and craftsmen.

This approach spans all functions and in particular the following areas:

Quality standards - how they are defined and understood.

Supplier relations - control of incoming materials through reliable inspection.

Process capability - including factory capability, worker skills, control and motivation.

Management control - through product design and development, provision of appropriate equipment and skills, careful production planning, supervision, and communication.

Customer relations - through effective monitoring of customer reaction and customer needs. Quality is not absolute. It is comparative and part of the value judgement is made by the customer. Knowing where quality standard and performance stands relative to competitors is also necessary in order to improve quality of design and to adopt the manufacturing process to achieve it consistently.

3. Standard specifications

There are no national Guyanese standard specifications for furniture or other wood-based products, nor is it likely that these will be introduced in the near future. Consequently it is up to the industry itself to establish its own standards since they are the surest way of improving the low level of technology currently practised by the majority of the firms in the industry.

This is no easy task and certainly not one which the industry could attempt to tackle alone. It is therefore recommended that this be included among the priority tasks of the newly constituted Forestry Development Unit within the Forestry Commission, working in close collaboration with the industry and possibly with the assistance of appropriate international agencies.

Many similar specifications are already in use in other countries, are readily available and could be used as a general guideline for the Guyana industry. Naturally they would require to be adapted to local needs and circumstances. Of special interest in this respect are those that are issued by the British Standards Institute particularly in relation to furniture and joinery production. These have already been adopted by many countries and could form the basis for an appropriate standard specification in due course.

I. Research and development

Total expenditure either direct or indirect on product research including suitable wood species is negligible. The prevailing view is that this is the responsibility of government alone and until such time as it sees fit or is pressured into providing it, nothing will be done. This situation is unfortunately symtomatic of the industry's general lack of dynamism, but is not in itself a serious impediment to its progress. There are many effective research organizations throughout the world providing wide-ranging programmes of research geared to the requirements of the furniture and other wood-using industries. These include comprehensive technical and information services to members on all aspects of the industry including marketing, design, production,technology, factory organization, productivity, standard specification, quality control and management systems and procedures.

The services envisaged by the newly established Development Unit within the Forestry Commission, which include research and development into the identification of Guyanese wood species for particular end-uses, wood preservation and seasoning meet, to some extent, the needs of these industries, but would require to be expanded considerably in order to bridge the gap between the industries present level of expertise and its ultimate aim of becoming a major export earner. Sawmillers who might wish to upgrade their activities or become involved in down-stream value-added activities, such as timber drying, preservation, dressing, moulding and even in the manufacture of wood components or elements (e.g. pre-fabricated timber-framed housing) would have to be prepared to invest in manufacturing facilities, but lacking both experience and practical knowledge in these fields would naturally be reluctant to undertake such ventures with out adequate advice and training. Together with existing secondary and tertiary wood processing they form a sizeable sector of the industrial economy of Guyana and having regard to Guyana's rich timber resources provide every justification for the expansion of services of this nature. Indeed, just as in most other major timber producing countries, including those which are still developing, there should be such a government supported organization capable of providing a comprehensive service in all aspects of wood processing. This organization would in effect be a Wood Industry Research and Development Centre. The Forestry Commission with upgraded skills and facilities is the obvious springboard for such a development. Considerable and detailed investigation into the precise needs of the industry would be an essential pre-requisite to the development of appropriate services and this should include visits by representatives of the industry and the relevant staff of the Forestry Commission to established institutes abroad including TRADA*, FPRL* and FIRA* in the United Kingdom. The Forestry Commission should also establish advisory committees made up of representatives of each sector of the wood-based industries who, together with the staff of the Commission, would set priorities in respect of specific research and development projects and monitor their progress.

* Timber Research and Development Association.

Forest Products Research Laboratories.

Furniture Industry Research Association.

Based on discussions with personnel in the industry and on observations during many plant visits made during the course of the project, the inclusion of the following activities in addition to those already referred to above, in any research and development project envisaged for the furniture and other woodworking industries is strongly recommended.

(a) Design and product development

This will include the design of new products and the re-designing of existing products in accordance with the requirements of individual plants; making prototypes of such products; assisting in product development to the stage when series production is reached; assisting in the solution of all technical production problems.

(b) Research into materials and production technology

Including solid wood, mibi and kufa (materials used in the manufacture of cane furniture and other items similar to Rattan), sheet materials (mainly plywood), upholstery materials; machining including machine setting up and tool maintenance, low cost mechanization quality control, technical problems associated with the export of wood-based items and components; finishing problems and the selection of appropriate finishing materials and systems; particular upholstery problems for cane and solid wood furniture.

(c) Furniture and joinery performance standards and specifications.

The drafting, in conjunction with the Guyana National Bureau of Standards, of a standards specification and test document for domestic (Residential) and contract (hotels and similar institutions) furniture joinery and wood-framed housing.

(d) Structure and performance testing

For components, elements and complete items of furniture and joinery board materials; adhesives; finishes (surface coating); jointing systems (mechanical and integral) foams, fillings and seat suspensions; fabrics for upholstery covering.

(e) Analytical services

Including fault finding and trouble shooting in respect of materials, machines and processing problems which arise at individual plant level.

(f) Technical and productivity services

Including plant evaluation, factory planning and re-organising, plant selection and utilization, work study, work programming, product costing, production planning and control, pneumatics and electrics,

machine adaptation compressed air and wood waste extraction systems, materials handling and internal transport systems.

(g) Technical information

This would be based on the combined knowledge of the technical staff allied to a comprehensive and up-to-date bank of technical information derived from books, journals, magazines and special reports all of which are concerned with many facets of secondary and tertiary wood processing. It should be made available as a technical enquiry service and the publication from time-to-time of papers on selected wood industry topics. See Annex 7.

(h) Training

This is concerned with demonstrations to managers and technical staff from the industry of the practical and commercial application of the work carried out by the Forestry Commission Development Unit. Each course would set out to meet a particular need in a relevant management or technical area and through a modified seminar/workshop approach would encourage active participation by participants. Topics would therefore include product design and development, materials and production technology, management systems and procedures, production and productivity, quality control, supervision, work planning and allocation, health and safety, finance and marketing. Training should also include fact-finding missions abroad in respect of marketing and technical study-tours.

(i) Cane production

The Development Unit should also include attention to the development of the cane sector of the industry, namely the processing of Kufa (Clusia sp.) and mibi (Heteropsis jenmani). In addition to the foregoing in respect of wood products, aspects which require immediate attention include a supply survey of the raw material, harvesting and transport, the establishment of a suitable replacement cycle, pre-production treatment including drying and protection from insect and fungal attack, mechanization of particular aspects of production especially for bending, jointing, sanding, and surface coating, product design and marketing.

(j) Marketing

This will include the preparation and publication of industrial statistics; the carrying out of market research surveys and forecasts on materials availability and usage in Guyanese and overseas markets, retailer and consumer attitudes and buying motivations.

A feature of the marketing department would be the organization of new planning workshops in order to improve an awareness of marketing and its importance to the industry. High priority should be given to direct liaison with individual enterprises and the latter should be encouraged to participate in all consultancy and training programmes and to make full use of the services offered.

All of the foregoing should be seen and understood in the context of a major objective of the Forestry Commission, namely, the provision of assistance to the wood processing industries in developing high quality timber products which are acceptable in international markets. The Commission should therefore place more emphasis on the establishment of efficient secondary and tertiary timber processing, the marketing of such products and the implementation of a promotional programme which is product and export oriented.

Development strategy

1. Promotion of the utilization of lesser-known species.

a) Resource research emphasizing the species forest composition with emphasis on those parts of the forest available for early harvesting.

b) Development of new groupings of species of lesser-known species by end-use or other specification.

c) Groupings having been identified a promotional programme to be launched.

d) Incorporation of those groupings into the Guyana Grading Rules for Hardwood Timber.

2. Expedition of the development of secondary and tertiary wood industries.

a) Carrying out of survey on existing secondary and tertiary wood industries with the aim of identifying products which require development and promotion.

b) Product development research to establish new timber product areas in response to domestic and overseas market requirements.

c) Establish and maintain re-organisation and development programme for existing wood-based industry with particular reference to product design, sawmill and factory organization, production and productivity, quality standards marketing and export orientation.

d) Through international aid agencies recruit specialist overseas consultants to assist in implementing this programme.

e) Organise industry trade missions to countries where Guyanese timber has been successfully utilized for the manufacturing of secondary and tertiary wood products.

f) Organise on a regular basis specialised training courses on design and product development, technology, factory organization and quality control.

g) Formulate a joint promotion programme between the Commission and the various wood-based industry sectors.

4. Export marketing of wood-based products.

1. General requirements

The world demand for fine hardwoods, such as those which are available in Guyana, will continue for the forseeable future. A very high proportion of the export volume is used by the furniture and joinery industries abroad and it is therefore logical that the Local Guyanese industry should seriously consider the production of furniture and other wood products for export in a variety of forms. This can add considerable value at source and boost foreign exchange earnings on hitherto only partly processed wood. The first requirement, therefore, is to do as much as possible of the processing of the wood as near to its origin as possible and thus avoid having to transport the waste.

Secondly, the timber should be carefully kiln-dried down to between 6 and 8 percent humidity and then machined, drilled and sanded so that all parts are ready for assembly and lacquering. During production, the components will absorb some moisture again after kilning and precautions should be taken to reduce this as much as possible. The most effective way is to complete all processing in the shortest possible time and, as a further precaution, all work-in-progress should be kept covered in polyethylene. Finally the goods should be packed in airtight or moisture tight packing at a moisture content which is guaranteed to be below 10 percent.

2. Product types

Sawmilling Products

(i) Accurately sawn and correctly dimensioned kiln-dried hardwood species scantlings (i.e. random lengths) and cut to length boards and planks which are prepared strictly in accordance with a wide variety of end-user requirements in the construction joinery, furniture, D.I.Y and general woodworking industries.

(ii) Dimensioned and preservative treated stock for railings fences etc.

(iii) Dimensioned stock for boxes and crates.

(iv) Re-dimensioning and squaring of offcuts from above which could be used as blocks for parquet flooring, chair, drawer, turned parts and parts including handles and knobs for occasional furniture components and for the production of a wide variety of domestic and general woodware and marine internal trim.

Moulded Products

(i) Kiln-dried hardwood which is planed, tongued, rebated, chamfered, V-jointed, centre V-jointed, beaded centre-beaded.

(ii) Wide variety of beadings and mouldings, surface coated and un-finished, which are used in builders woodwork, furniture, joinery and D.I.Y stores.

(iii) Decorative mouldings which are used for picture and frame production.

(iv) Moulded components for door and window frame production. Stair treads, hand rails, bannisters, plinths, architraves, curtain rods and rings.

(v) Broomsticks and dowels.

(vi) Container flooring.

(vii) Wall panelling in a variety of moulded finishes.

Joinery Products

(i) Range of standard builders joinery including framed and panelled interior and exterior doors and door jambs, windows and window frames, staircases, louvre doors and panelling.

(ii) Purpose designed architectural joinery.

(iii) Roof trusses.

(iv) System housing components.

(v) Garden sheds and patios.

Furniture Products

1. Dimensioned stock or sized blanks which are straight sawn for square edged components e.g. shaped chair legs, arms and backs. These may be shipped out in this form and finally machined by the importer/ manufacturer if the skills or equipment are not available locally;

2. fully machined and sanded components which are manufactured to the customer's specification and are ready for assembly. Further value may be added by introducing turnery, in-lay work and wood carving where appropriate; (see figures9 and 10)

3. a wide variety of mouldings, both large and small section, which are used by the furniture industry, e.g. astragal, cyma recta (ogee), cyma reversa, beading and scotia;

4. fully assembled framed and panelled and louvred doors and drawer fronts which are used in the production of a wide variety of storage units for kitchens, living-room and bedroom furniture. These would also be manufactured to the customer's specification;

5. completely or partly knocked-down (K.D.) furniture especially dining-room chairs, show-wood seating and table frames which are lacquered and ready for assemoly. These could be in accordance with a customer's specification or designed and produced by the local manufacturer on the basis of market research and knowledge of specific market requirements (see chapter on design);

6. fully knock-down garden furniture made preferably in Hububalli; fireplace surrounds;

7. fully assembled occasional furniture which is well designed and packs economically.

In all of the above cases, the Guyanese manufacturer must, as a general rule, produce a quality which is slightly above what the customer will expect from his own factory or his own supplier. At the same time the price must be slightly below local production costs or, in the case of fully finished furniture, below local factory prices.

3. Target markets

Initially these should be confined to the Caribbean region with particular emphasis on Trinidad and Tobago, U.S Virgin Islands, Martinique, Bahamas and Curacao. Later they should extend to the South East of North America particularly Florida, North and South Carolina.

These markets offer the best opportunity for sub-contracting since the tendency in each is wherever possible to "buy in" hardwood ready-machined components. An additional advantage is that with the exception of Martinique, the English Language is the accepted one in trade and commerce.

Specific requirements for each of the markets referred to should be the subject of further detailed investigation of the kind referred to in the chapter dealing with follow-up action.

4. Methods of distribution

All three markets are typical in that selling through a domestic agent or importer is more appreciated than individual companies attempting to do their own selling. This provides easier and faster access to the market and in the end is far less expensive. An added advantage is that an agent or importer can be of considerable assistance in locating and shipping much needed technology, raw materials, spares and accessories to the Guyanese manufacturer who in other circumstances, might well find it impossible to do so himself. He can also provide vital feedback on customer reaction, competitor activity and developing trends.

5. Export processing

The successful export of wood-based merchandise does not end with having saleable and competitively priced products. If its transhipment is not accompanied by supportive and trouble-free documentation and other procedures, especially at the point of departure, all other efforts may well be negatived. In this connection, many exporters complain of what appears to them to be time-consuming and unnecessary bureaucratic paper work, where the letter rather than the spirit of the law is paramount. This, they say, often causes undue delays in shipping which in turn erodes confidence on the part of their customers and leads to subsequent losses of business. They also complain that it is extremely difficult to obtain the permitted fifteen percent retention of foreign exchange earnings which are urgently required for the purchase of machinery spares, accessories and raw materials not obtainable in Guyana.

The consultant is satisfied that there is sufficient credence in these complaints to justify their being taken up with the relevant authorities and recommends that this be done on behalf of the exporters by the Marketing Division of the Forestry Commission and by the Export Promotion Council.

Table 1 provides a summary assessment of each individual enterprise visited during the course of the mission which indicates its potential for export in the near future. It should be noted that the identity number given to each enterprise does not relate to that in Annex 3.

Manufacturers attention is drawn to publications by the International Trade Centre UNCTAD/GATT Geneva which provides analysis of the major markets for furniture and other wood-based products from developing countries.

K. Co-operation in the industry

Many of the problems which this report highlights in the Guyanese industry are characteristic of the industry in many countries. The industry structure is similar in many ways but there has been a definite trend in the

Table 1 Inter-firm comparison based on individual enterprise

Summary assessment

	ASPECT	ENTERPRISE																		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	Production Facilities	C	A	B	A	A	B	C	B	B	C	B	B	B	A	A	B	B	B	
2	Kiln-Drying Facilities	C	A	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
3	Machine Maintenance Facilities	C	A	A	B	B	B	C	B	B	C	C	C	C	C	B	C	C	B	
4	Factory Organisation	C	B	B	B	C	B	C	B	C	C	C	B	B	B	B	B	C	B	
5	Management & Technical Capability	B	B	B	B	C	B	B	A	B	B	B	B	B	B	B	B	B	A	
6	Timber Availability	A	A	B	A	A	A	B	A	A	A	A	B	B	B	A	A	B	A	
7	Other Materials Availability	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	B	A	
8	Design & Product Dev. Capability	C	A	B	B	B	A	C	A	B	C	C	A	A	B	B	B	B	A	
9	Capacity Utilization	B	B	B	B	B	B	B	B	C	B	B	B	B	B	B	B	C	C	
10	Quality Standards	B	A	A	B	B	A	C	B	C	C	C	B	B	B	B	B	B	B	
11	Productivity	B	B	B	B	B	B	C	B	C	B	B	B	B	B	B	B	C	B	
12	Marketing Capability	B	C	C	C	C	B	C	A	C	C	B	B	A	B	B	B	C	A	
13	Current Exports	C	C	C	C	B	B	C	B	B	B	B	B	B	C	C	C	C	C	
14	Export Potential Sub-Contracting	C	A	A	B	B	A	C	B	B	B	C	B	B	B	A	C	C	A	
15	Export Potential - Furniture & Other Parts	B	A	A	B	B	A	C	B	B	B	C	B	B	B	A	C	C	A	
16	Export Potential - Finished Goods	B	A	A	B	B	A	C	B	B	B	C	B	B	B	B	C	C	A	

KEY: A - Satisfactory ; B - Requires Improvement ; C - Unsatisfactory.

latter for the number of manufacturers to be reduced especially over the last twenty years. As a consequence, the remaining firms have grown larger, nearer to their optimum size or maximum efficiency. Among the smaller manufacturers there has been a willingness to realize the disadvantages under which they operate due to their size, such as design and marketing expertise and lack of finance. Their answer to this problem has been the establishment of a number of co-operative manufacturing and marketing groups.

The co-operative marketing groups can take various forms and supply different services to its members. In some cases the marketing companies themselves are fully owned by the supplier manufacturers and in others the arrangement between the marketing company and the suppliers is purely a contractual one. There are advantages and disadvantages in both types, but it is important that the participating manufacturers recognise that they have mutual interests, that they must operate successfully as a group or possibly not at all and that they enter into a group effort with a full committment to its principles and objectives.

The consultant strongly recommends that serious consideration be given by manufacturers to this or other forms of association, particularly in relation to exports. None are sufficiently financially or technically strong enough to go it alone and all would benifit from a pooling of essential expertise particularly in relation to product design, technology and marketing. This recommendation should prove of particular interest to the enterprises which were icentified as having export potential in the immediate future.

L. Follow-up action

The consultant recommends immediate follow-up action in the shape of further international assistance for the furniture and other wood-based industry based on the recommendations contained in this report.

Naturally some manufacturers especially those already engaged or about to engage in export will progress at a faster rate than others, so there should be sufficient flexibility built into any future development programme to allow for this eventuality. There are, however, only marginal differences between enterprises in this respect and all manufacturing concerns should benefit considerably from professional advice and assistance in market orientation, product design and adaptation, factory organisation and production technology, management systems and procedures, quality control and industrial training.

Accordingly, the consultant recommends that the following be undertaken without undue delay:

(a) Seminar on furniture and joinery industries.

This is proposed for appropriate concerns not only in Guyana but throughout the Caricom Region. The objective would be to provide participants

with an insight into the latest design and manufacturing trends and the efficient and modern techniques of furniture and joinery production and marketing.

International specialist consultants would be recruited to deal in depth with the topics referred to and would adopt a modified seminar/ workshop approach in dealing with their subjects matter. The emphasis would be on practical demonstrations where appropriate and participants would be encouraged to use the opportunity to solve their individual plant problems.

The duration of the course would be two weeks. It would be residential and a likely location would be Barbados because of ease of access and the ready availability of course facilities. It is envisaged that there would be six participants from the Guyanese industry and in particular those who are export oriented.

(b) Provision of technical facilities.

These are detailed in Annex 6 and, in the main, refer to the re-equipping of the Development Unit of the Guyana Forestry Commission so that it can provide a comprehensive technical and advisory service to the furniture and joinery industry relating to:

Machine and tool maintenance;

Wood drying;

Wood preservation and;

Product design and development.

(c) Design and product adaptation.

Commissioning of internationally established furniture and wood products designer to assess in more depth the current state of product design in the industry and to advise on the introduction of new designs and/or the adaptation of existing ones. The objectives would be

1. To give general guidance on international design trends with particular reference to the European and North American export markets for modern and traditional Western and Oriental designs.

2. To provide specific design advice and evaluation to individual manufacturers and advise on short and long term design/ production remedies.

3. To explore the extent of possible design solutions in circumstances of acknowledged limitations in materials, production skills and manufacturing equipment.

4. To cover the wider implications of design relevant to manufacturing, marketing and promotion.

Duration: Three one-month periods extending over at least one year.

(d) Management and technical consultancy

To provide in-plant service and assistance on all aspects of the industry based on a pilot scheme project for the six most suitable enterprises and incorporating the following:

1. Preparation and implementation of detailed plans for the re-organisation and development of participating enterprises in relation to raw materials procurement and utilization, manufacturing facilities, product design and development, productivity, quality standards, production for export.

2. Formation of manufacturing/marketing groups capable of producing and promoting integrated ranges of wood products for export.

3. Identification of export market opportunities and selection of suitable market sectors, preparation of marketing plan.

4. Implementation of marketing plan in respect of promotion, sales and repeat purchases.

5. Participation in trade fairs and establishment of marketing channels.

6. Organization of market orientation tour to enable participants to visit their target markets in order to gain firsthand experience of the various markets and market requirements, to establish personal relations with various customers, to present their products (through samples catalogues etc) to obtain initial or sample orders and to explore the scope for technical co-operation, e.g. in the form of joint ventures, subcontracting etc.

Duration: Three one-month periods extending over one year and co-inciding with the proposed product design consultancy.

Consultant: Senior marketing and production consultant in the wood industries.

(e) Special training requested for Forestry Commission staff.

1. Attendance at the Workshop on Production Management in the Public Sector for Mechanical Wood Processing Industries. This is organised jointly by UNIDO and the International Centre for Public Enterprises in Developing Countries.

Location: Yugoslavia.

Duration: Three weeks.

2. Attendance at kiln-drying course organised by The Timber Research and Development Association (TRADA) United Kingdom.

Location: High Wycombe, Buckinghamshire. U.K.

Duration: Six weeks.

3. Attendance at the Furniture Technology and Production Management Course organised by the Furniture Industry Research and Development Association (F.I.R.A) Stevenage, Hertfortshire U.K.

Location: Stevenage.

Duration: 6 weeks.

4. Study tours to developing and developed economies in order to study trends and developments in timber research and their application in the local wood processing industries. Preferred countries include the Philippines, Malaysia, Singapore, Thailand, Burma, Jamaica and the U.S.A.

III. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

1. The Guyanese furniture and wood-based industry is reasonably well established but has a relatively small home market. Exports of finished or partly-finished wood products are negligible.

2. There is a lack of well designed furniture, mainly because the industry does not fully appreciate the function of design in this context. Most items tend to be custom-built and are copies taken from foreign manufacturers' catalogues. There are no trained furniture designers.

3. Manufacturing facilities i.e. buildings, machinery and equipment are reasonably good but the importance of plant layout and factory organization are again not fully understood nor appreciated.

4. Production technology techniques and quality standards vary considerably from factory to factory. In general there is considerable room for improvement in all three, which, if achieved, would lead to a more satisfactory level of productivity and greater potential for exports.

5. Production fluctuates in step with demand. A principal cause of this is the practice of custom-building and direct selling of furniture to the public.

6. Very few firms are financially strong. There is a serious shortage of working capital and capital for expansion.

7. The industry is experiencing a shortage of suitable timber species for furniture and joinery manufacture. When available, they are undried, second or third grade and usually in unsuitable and wasteful dimensions.

8. Other essential materials, as well as spares and accessories for processing machinery and equipment which have to be imported, are also in very short supply and often unobtainable. If bought on the open market, they are generally outrageously expensive.

9. Exports of any consequence are confined to one or two manufacturers who ship out in KD (knock-down) form. Export prospects for the remainder will depend on their ability to adapt for this purpose. At least four other manufacturers appear to be close to the standards required.

10. The industry's management deficiencies are most apparent in marketing, design and production.

11. The industry, for the most part, seems to be largely unaware of and isolated from the technical and other developments which have taken place in furniture and joinery manufacture throughout the world.

12. There are no appropriate training facilities for operatives technicians and production management personnel. Skilled labour turnover is very high.

13. The firms in the industry have yet to learn to see themselves as competing with other consumer durables rather than simply between themselves. There is little or no co-operation between firms even in activities which would be to their common benefit.

14. Support services from other state organizations especially in respect of product research and development, productivity, marketing, export processing, and industrial training need to be upgraded so that they relate more specifically to the needs of the industry.

15. The future of the industry lies mainly in the full exploitation,,in respect of value-added, of Guyanese hardwoods, especially those which already enjoy acceptance in foreign markets.

16. If the industry accepts the recommendations contained in this report and is given the opportunity of acting on them without delay, there is little doubt that it can become strong and viable within the next decade and capable of winning a large export trade.

B. Recommendations

1. General

The Guyanese furniture and joinery industry, the Forestry Commission and the Export Promotion Council should collaborate closely in a programme of adaptation for the industry with a view to developing its export potential. Among the matters to which they should give immediate attention are:

(a) The unsatisfactory standard of design;

(b) The need for a rationalised production policy for individual firms and for the industry as a whole;

(c) The need for joint effort, particularly in ensuring the supply, purchase, handling and preparation of timber and other materials, processing equipment and essential spares;

(d) The low level of production efficiency and quality standards;

(e) The need to raise the standard of labour productivity;

(f) The urgent need for management, technician and labour education and training;

(g) The need to develop export conciousness.

2. Design

(a) The organizations referred to above should seek the assistance of international agencies and in particular UNIDO and ITC (UNCTAD/GATT) in raising the general standards of design in the industry.

(b) This can best be achieved by commissioning short-term consultancy programmes to advise on design and product development at individual factory level.

(c) Firms should co-operate in producing non-competing but complementary ranges of furniture and other wood products, especially for export.

(d) The Development Unit of the Forestry Commission should ensure that state bodies and Government Departments should insist on high standards of design and execution in the furniture they buy or the purchase of which they finance.

(e) In order to develop native design expertise architects and others with a flair for design should be encouraged and assisted to train overseas.

3. Buildings

(a) Attention should be given to the matter of the improvement of factory buildings in respect of layout, use of space and general working conditions.

(b) Some manufacturers should endeavour to transfer to modern buildings which are more in keeping with production requirements.

4. Machinery and equipment.

(a) Most manufacturers urgently require additional machinery and equipment for production. The state should provide import licenses and the relevant foreign exchange to enable them to purchase it without delay. This applies especially to those manufacturers with a desire to export.

(b) Most firms require to have their plants re-planned in accordance with the established work flow for solid wood processing. They also require the installation of dust/wood-waste exhaust and compressed air-line systems.

(c) The industry should make use of work study in arranging for production and should also use low-cost mechanization, simple handling devices and appropriate internal transport systems.

(d) Continuous efforts should also be made to adapt machines for particular processing production purposes by the widespread use of jigs, formers and fixtures.

(e) The industry urgently needs kiln-drying and machine and tool maintenance facilities. These should be made available industry-wide through their establishment at the Development Unit of the Forestry Commission.

5. Raw materials.

(a) The Forestry Commission should ensure the availability of an adequate supply of suitable first quality hardwood of species whose end-use is particularly suited to the manufacture of furniture and joinery. This is particularly critical in respect of exports.

(b) The Forestry Commission should also investigate the potential for this kind of production of other less well-known species which might be equally suitable. The assistance of overseas timber research institutes should be sought in this respect, particularly in those countries targetted for export.

(c) A serious effort should be made by the Commission to control the price of such hardwoods especially if they are destined for the production of merchandise for export.

(d) Other essential raw materials such as adhesives, lacquers, hardware, fittings and accessories, upholstery materials and fabrics, lubricants etc, should also be made available at non-inflated prices.

6. Production

(a) The introduction of purpose-designed and more rationalized ranges should allow for greater specialization and the introduction of series production. This in turn should lead to improved quality standards, higher productivity and lower costs.

(b) The industry's technological base should be strengthened by greater awareness of established production techniques particularly in relation to the processing of solid wood.

(c) This can best be achieved by technical consultancy, professional product design, attendance at industry organized seminars/workshops the availability of relevant technical literature and participation in technical and marketing fact-finding missions abroad.

(d) Quality standards require to be rigidly applied especially in the key areas of machining, sanding and finishing.

(e) In this connection the industry should immediately adopt the standard specifications detailed in the British standard for furniture (B.S. 4874: Parts 1-4). It may, however, need to be adapted to suit special Guyanese requirements.

(f) Prototyping and product development should be a feature of each factory's production preparation. They should, however, be carried out independently of production.

7. Industrial training.

(a) Industrial training for all levels of personnel in the industry is urgently needed. It should include in-plant training as well as training in technical institutes.

(b) Of particular importance is the training of furniture and wood industry technicians whose main function would be to plan, develop and supervise the technical and quality aspects of production.

(c) Care should be taken by those whose responsibility it is, to accurately identify the training needs required and then gear them to the precise needs of the industry.

(d) Training institutes should only be staffed with instructors who are fully experienced in woodworking technology and know the industry well.

8. Research and development.

(a) The Development Unit of the Forestry Commission should be the centre for research and development for all sectors of the wood-based industry.

(b) It should, however, concentrate on applied research in respect of products, raw materials, technology, marketing and technical information.

(c) It should cater specifically for the industry's needs, most of which have been identified in this report. Accordingly, it should equip itself fully for this task and, where appropriate, seek the assistance of international agencies towards this end particularly in relation to equipment and staff training.

(d) The Development Unit should itself engage in industrial training by means of seminars and workshops on technical and other subjects related to the industry's manufacturing and marketing base.

9. Export marketing

(a) Special training courses and seminars should be organized by the Forestry Commission to enable the industry to understand what marketing means in the context of furniture and joinery exporting.

(b) If necessary international assistance should be sought towards this end as a matter of urgency.

(c) The export marketing of furniture from Guyana for the foreseeable future appears to be mainly in the sub contracting of dimensioned stock, machined components, mouldings and turnings.

(d) There are also distinct possibilities for the production of high quality elements such as cabinet doors and drawer fronts for use in a wide variety of storage units.

(e) A further possibility lies in the production of a well designed range of completely knock-down garden furniture using Guyanese hardwoods.

(f) Initial export marketing efforts should be concentrated on those countries where Guyanese hardwoods have already a strong foothold and where these materials are used extensively by the local furniture industry there.

(g) Distribution arrangements should be in the hands of an experienced and knowledgeable importer/agent who would also be prepared to assist in obtaining essential materials and equipment not available in Guyana as well as providing appropriate marketing and technical information.

9. Follow-up action.

(a) The Guyana Forestry Commission should, as an earnest of good faith to the furniture and joinery industry, immediately pursue the implementation of the recommendations contained in the chapter dealing with follow-up action.

(b) This should be regarded as the initial stage in the programme of adaptation urgently needed by the industry if it is to succeed in becoming export oriented. It should be promptly followed by the implementation of the other recommendations contained in this report.

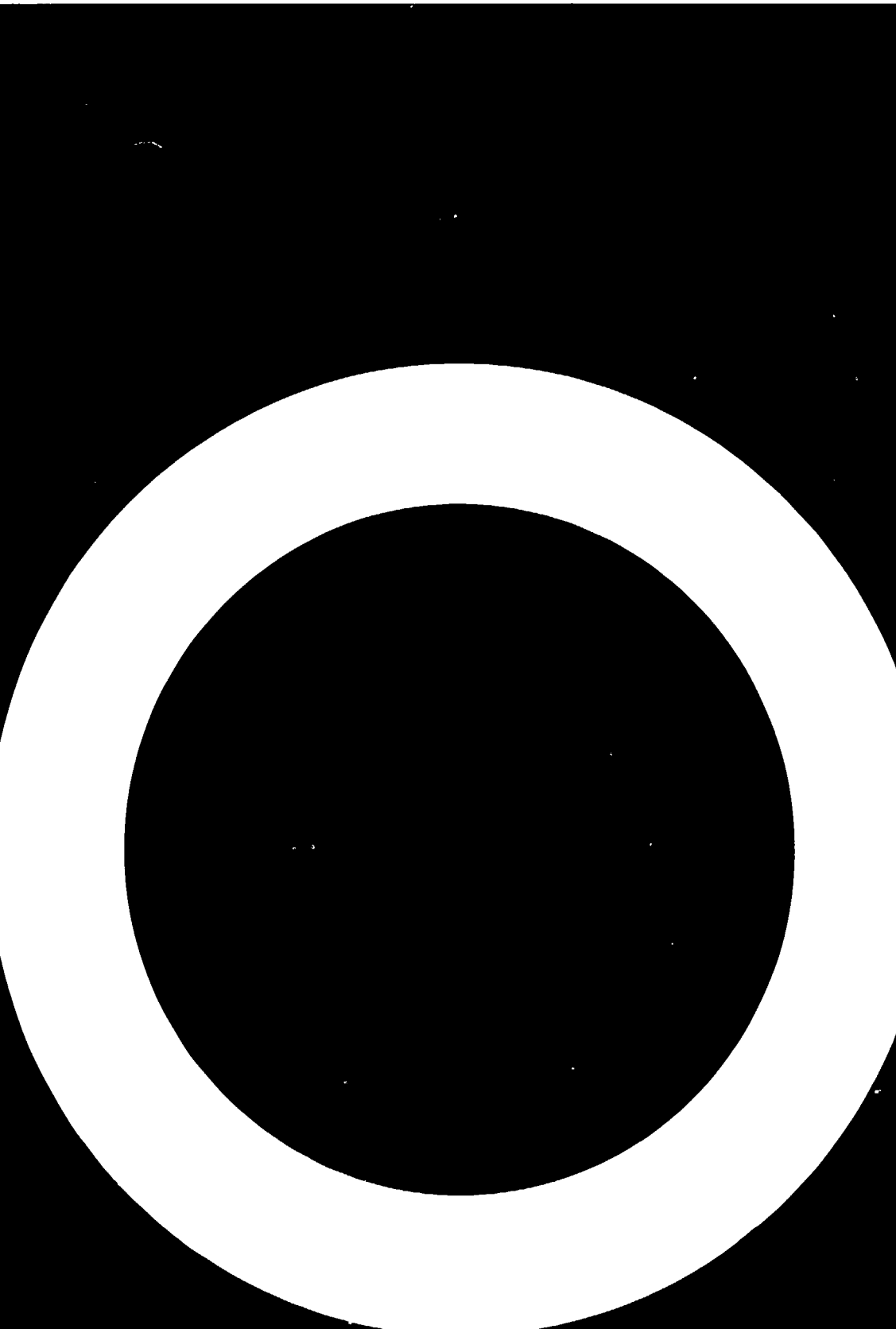
10. Addressed to the Guyana Manufacturers Association.

(a) The membership of your organization should be strengthened so that it is totally representative of the furniture and joinery industry throughout the entire country.

(b) It should actively pursue the interests of the Association and ensure that all state sponsored activities generated on behalf of the industry are done so on the basis of prior consultation and agreement.

(c) It should encourage and foster a spirit of co-operation and trust among members so that a real identity is achieved for the industry. Among the matters which need to be dealt with urgently are: the supply of suitable and inexpensive raw materials, both local and

imported; the availability of sufficient foreign exchange for the purchase of essential materials and equipment and; active negotiation with the Ministry of Finance leading to a reduction in recently imposed consumption tax which otherwise may threaten the future prospects of the industry.



Annex 1

CONSULTANT'S JOB DESCRIPTION
SI/GUY/84/801/11-01/31.7.A

Post title	Consultant in Furniture Production
Duration	Two months
Date required	As soon as possible
Duty station	Georgetown
Purpose of project	To make a survey of the wood manufacturing industry of the country and provide short and long term recommendations for its development.
Duties	In co-operation with counterpart staff of the Forestry Commission, the consultant will survey and assist the wood furniture sector. In particular, the consultant will be expected to:

1. Prepare a questionnaire for the survey of the national wood manufacturing industry;

2. Prepare a job description to select the national professional (woodworking industry consultant) who will assist in the distribution of the questionnaire, the survey itself and the compilation of the data collected;

3. Analyze the results of the survey and on that basis, present in a report medium and long term recommendations for the sector as a whole, identifying its technical needs;

...../..

4. Provide limited trouble-shooting advice to selected firms visited on product design, production methods, low-cost automation, finishing and other specialized fields, in consultation with the counterpart agency, bearing in mind the availability of ancillary materials and production requirements.

The consultant will be expected to prepare a final report, setting out the findings of the mission and recommendations to the Government on further action which might be taken.

Qualifications — Wood technologist or engineer with experience in production of solid wood and upholstered furniture. Familiarity with conditions in developing countries essential.

Language — English

Annex 2

Furniture and woodworking plants survey

1. Questionnaire

1. Company Profile

1.1. Name of company:

1.2. Office address:
Tel: Telex:
Cable:

Factory address:

1.3. Contact executive (s):

1.4. Year established:

1.5. Year of commencement of exports:

1.6. Type of business

Manufacturer .....
Manufacturer Retailer .....
Manufacturer Exporter .....
Other (specify) .....

1.7. Legal status:

Sole proprietor ..... Private Ltd Co. .....
Co-operative ..... Govt. owned Co. .....
Partnership ..... Others (specify) ....
Public Ltd Co. .....

1.8. Capital:
Authorized:
Paid up

1.9. Ownership:
Local: %
Foreign: %

1.10. Total No. of employees:
Office:
Production:
Total:

1.11. Gross sales:

Year	Domestic	Overseas	Total

2. Product Profile

2.1. Product description

Solid wood furniture	Prefabricated housing .....
Panel furniture	Doors and windows .....
Upholstered furniture	Parquet/strip flooring .....
Bedding	Joinery parts .....
Cane furniture	Moulding .....
Furniture parts	Turned parts .....
Outdoor furniture	Boat building .....
Domestic woodware	Pallets .....
Wooden toys	Boxes crates .....
Others (specify)	Vehicle bodies .....

2.2. Product specification

Own design	Architect .....
Ex catalogue	Standard specification .....
Customer design	Copy .....
Designer	Other (specify) .....

2.3. Quantities produced

Single items	Batch production (specify) .....
Other (specify)	Continuous production .....

2.4. Usual delivery period:

2.5. Other relevant information:

3. Raw Materials Profile

3.1. Timber species used

Species	Annual imput b.ft.	Average purchase price, air dried b.ft.	Average purchase price, kiln dried b.ft.
Crabwood			
Hububalli			
Simaruba			
Determa			
Red Cedar			
Silverballi			
Locust			
Dakamaballi			
Dukali			
Durbanpine			
Kirikaua			
Iteballi			
Kabukalli			
Kurahara			
Kurokai			
Mamara			
Purpleheart			
Shibadan			
Brown Silverballi			
Tauroniro			
Tatabu			
Greenheart			

3.2. Timber supply and working characteristics.

Species	Supply			Machining			Sanding			Finishing		
	Good	Fair	Poor	Good	Fair	Poor	Good	Fair	Poor	Good	Fair	Poor
Crabwood												
Hububalli												
Simarupa												
Determa												
Red Cedar												
Silverballi												
Locust												
Dakamaballi												
Dukali												
Durbanoine												
Kirkaua												
Iteballi												
Kabukalli												
Kurahara												
Kurokai												
Wamara												
Purpleheart												
Shibadan												
Brown Silverballi												
Tauroniro												
Tatabu												
Greenheart												

3.3 End use of various species.

Species	Furniture	Joinery	Pre-fab Houses	Moulding	Flooring	Other (specify)
Crabwood						
Hububalli						
Simaruba						
Determa						
Red Cedar						
Silverballi						
Locust						
Dakamaballi						
Dukali						
Durbanpime						
Kirikaua						
Iteballi						
Kabukalli						
Kurahara						
Kurokai						
Wamara						
Purpleheart						
Shibadan						
Brown Silverballi						
Tauroniro						
Tatabu						
Greenheart						

3.4. Other materials

Materials	Supply			Local	Imported	Quality			Average price per unit.
	Good	Fair	Poor			Good	Fair	Poor	
Plywood									
Plastic Laminates									
Locks									
Handles									
Hinges									
Castors									
Mirrors									
Adhesives									
Sandpaper									
Oils									
Stains									
Fillers									
Lacquers									
Nails									
Pins									
Screws									
Staples									
Upholstery covers.									
Foams									
Other fillings									
Springs									
Webbing									

3.5. Is supply of raw materials satisfactory? If not, please indicate the major problems. (Rank five problems in order of importance).

Local materials

Irregular availability .....

Fluctuating price .....

High cost .....

Unsuitable dimensions .....

Quality not conform to specifications .....

Quality of local materials do not compare favourably with imported materials .....

Government regulations and procedures cumbersome .....

Imported materials

Restriction on imports .....

High import tariff and taxes .....

Fluctuating prices .....

Long delivery time .....

High prices .....

Import procedure and regulations cumbersome .....

Other (specify) .....

Any other relevant information or comments.

4. Manufacturing Profile

4.1. Site and Building

Site area:_____ Length:_____ Width:_____

Timber storage, covered:_____ Uncovered:_____

Production	Length	Width
Machining		
Assembly		
Finishing		
Upholstery		
Dispatch		
Product development		
Machine maintenance		
Other materials storage		
Storage for work in progress.		
Weight to saves		

Single storey: ..... Multiple storey: .....

Floors: Concrete: ..... Wood: ..... Other (specify) .....

Space: Open: ..... Subdivided: .....

Lighting: Natural ..... Artificial ..... Other (specify) .....

Power: Three phase ..... Single phase .....

Room for expansion: .....

Have you expansion plans (specify): .....

4.2. Machinery and Equipment.

Process	Model/Type	H.P	Age Yrs	Condition			Purchase Price
				Good	Fair	Poor	
1. Cross-cutting							
2. Band sawing							
3. Ripping							
4. Planing and Thicknessing.							
5. Planing and Moulding.							
6. Moulding.							
7. Turning							
8. Morticing							
9. Tenoning							
10. Dovetailing							
11. Boring							
12. Drilling							
13. Sanding							
14. Other (specify)							

4.3. Ancillary production equipment. (1)

Equipment	Model/Type	Age Yrs	Condition			Purchase Price
			Good	Fair	Poor	
1. Dust exhaust system.						
2. Compressor						
3. Compressed air system.						
4. Spray Booths						
5. Spray Guns						
6. Pneumatic tools (specify)						
7. Power tools (specify)						
8. Internal transport (specify)						
9. Spares and accessories.						
10. Tool maintenance (specify)						
11. Other (specify)						

4.4. Ancillary production equipment. (2)

Type of cutting tools generally used

High speed steel .....

Tungsten carbide tipped .....

Other (specify) .....

If equipped with pressure impregnation plant state:

Number of units: _____

Capacity : _____

Type of treatment : _____

If equipped with kiln drying facility state:

Number of units: _____

Capacity : _____

Type/Model : _____

Supply of fuels and lubricants. Good ..... Fair ..... Poor .....

Source of power: G.E.C ..... Diesel generator .....

Other (specify) ..... Gasoline generator .....

Cost of power. _____

Any other relevant information.

4.5. Is supply of production machinery and ancillary equipment satisfactory?

If not, please indicate the major problems (Rank problems in order of importance:

Shortage of foreign exchange: ..... High prices: .....

Restriction on imports: ..... Long delivery time: .....

Import procedure and Regulations cumbersome: .....

High import tariff and taxes: .....

Others (specify): .....

4.6. If production capacity is under utilized, what are the major reasons? (Rank reasons in order of importance)

Insufficient domestic demand: ..... Insufficient overseas demand: .....

Shortage of raw materials: ..... Shortage of spares and accessories: .....

Lack of working capital ..... Lack of adequate power .....

Non availability of skilled labour: ..... Non availability of unskilled labour: .....

Other (specify)

5. Personnel Profile

5.1. Management and Supervision

Functions	General education	Relevant technical/managerial training
1. Owner/manager:		
2. General manager:		
3. Production manager:		
4. Marketing sales manager: ...		
5. Financial and admin. manager:		
6. Production supervisor		
7. Machine setting-up and maintenance:		
8. Other (specify):		

State which, if any, of above functions are exercised by the same person.

No(s) _____

What in your opinion, are the major constraints in employing suitable management personnel.

Shortage of trained managers: ..... Emigration .....

High salaries sought: ..... Other industry competition: .....

Unattractiveness of wood industry ..... Other (specify) .....

Lack of job security: .....

5.2. Supervisors/Charge hands/Foremen for:

Timber yard:.....

Drying kiln (s):.....

Pressure impregnation plant: .....

Break-down mill: .....

General machining: .....

Assembly/Joinery: .....

Finishing (lacquering): .....

Sanding: .....

Upholstery: .....

Other (specify): .....

5.3. Have you or any of your management/supervisory personnel attended training courses conducted by:

Organisation	If yes, specify
Guyana Management Institute	
Government Technical Institute	
Guyana Manufacturers Association	
Extramural Department of University of Guyana.	
United Nations Industrial Development Organisation (UNIDO).	
International Trade Centre UNCTAD/GATT.	
Other (specify)	

5.4. Management systems and procedures	
Activity	If yes, specify
1. Production planning:	
2. Series production:	
3. Product costing:	
4. Quality control:	
5. Piece work:	
6. Incentive bonus schemes:	
7. Work study:	
8. Marketing:	

5.5. Labour

State the number of employees, male and female engaged in each of the following:

Department/Section	Male	Female	Total
1. Timber yard			
2. Pressure impregnation			
3. Kiln drying			
4. Break down mill			
5. General machining			
6. Sanding			
7. Furniture assembly			
8. Joinery			
9. House element assembly			
10. Surface finishing			
11. Cutting and sewing			
12. Upholstery			
13. Others (specify)			

5.6 Usual standard of education attained by employees:

General education: _____

_____

Technical education: _____

_____

5.7. How do you train your workers?

On the job training: ..... Technical Institute: .....

5.8. Hourly/daily wage rate: Male: $ _____ Female $ _____

Hourly/daily overtime rate: Male $ _____ Female $ _____

5.9. Normal working week: Hours:.....

Average weekly overtime: Hours: .....

5.10 Contract workers.

Number employed: Male:..... Female:.....

Average weekly earnings: Male:..... Female:.....

Method of payment (specify)

5.11 Any other relevant information.

6. Marketing Profile

6.1. Quantity available for export Per order: $ Per year: $	6.2. Delivery period 6.3. Quotations F.O.B ..... CIF ..... C.F ..... 6.4. Terms of payment: 6.5. Port(s) of shipment:

6.6. Previous exports

Year	No. of Units.	Value	Main markets.

6.7. Availability of sales aids.

Samples: ..... Catalogues: ..... Other (specify) .....

Photos: ..... Price list: .....

6.8. Packaging and quality control

List important packaging materials

Are there any problems related to their availability?

yes:..... no: .....

If 'yes', please specify

Do problems exist regarding quality control?

yes: ..... no: .....

If 'yes', please specify.

6.9. What in your opinion are the major constraints which affect your exports? (Rank constraints in order of importance)

Lack of market information: .....

Lack of market demand: .....

Lack of trade contact: .....

Low prices: .....

Inadequate shipping services: .....

High shipping costs: .....

Other specify: .....

Discrimination tariffs: .....

High import tariff: .....

Non tariff barriers: .....

Payment problems: .....

Quality requirements too demanding: .....

Restrictive import regulations: .....

6.10 Please specify areas of assistance needed to achieve increased exports. (Rank in order of importance)

Market information: .....

Export incentives: .....

Market survey: .....

Export finance: .....

Raw materials: .....

Packaging: .....

Trade contact: .....

Selling mission: .....

Reduction in taxes/duties: .....

Export management training: .....

Product adaptation: .....

Product design: .....

Improvements in production techniques: .....

Improvements in quality: .....

Others (specify): .....

6.11. Are you interested in joint venture agreements? yes:..... no:.....

If 'yes', please indicate your interest:

Management: ..... Finance: ..... Marketing:..... Technology:.....

6.12. Are you planning to diversify your export markets yes:..... no:.....

If 'yes', which countries

1) 4)

2) 5)

3) 6)

6.13. Are you in need of financing yes: ..... no: .....

If 'yes', please check (List in order of importance)

Raw materials financing:..... Export credit financing:.....

Machinery financing: ..... Additional working capital financing:.....

Joint venture financing: ..... Expansion financing:.....

Other (specify):.....

6.14. Would you like to make suggestions concerning export development of your products?

7. Financial Profile

7.1. Costs.	$	%
Timber		
Plywood		
Plastic laminates		
Ironmongery		
Fittings		
Adhesives		
Finishes		
Upholstery covers		
Upholstery frames		
Fillings and foams		
Springs and webbing		
Bought in parts		
Bought in finished goods		
Other materials (specify)		
Outwork (payment for work done on materials supplied by you)		
Production wages*		
		100

*All wages concerned with production whether direct or indirect.

7.2. Manufacturing overhead	$	%
Holiday pay		
Light and power		
Rent and Rates		
Building depreciation		
Building, maintenance and repairs.		
Plant and machinery, maintenance & repair		
Consumable stores		
Design development		
Rectification and Inspection		
Any other manufacturing expense		
a.		
b.		
c.		
d.		
Total		100

7.3. Distribution overhead	$	%
Wages and salaries		
Packing and storing expenses		
Truck drivers wages		
Vehicle depreciation		
Vehicle operating expense		
Other distribution costs		
a.		
b.		
Outside contractors charges		
Total		100

7.4 Selling overhead	$	%
Sales representation and office		
Travelling and entertainment		
Advertising and exhibition cost		
Trade discounts allowed		
Bad debts		
Other selling expenses		
a.		
b.		
Total		100

7.5 Administration overhead	$	%
Salaries (other than above)		
Telephone, Telegrams, Postage		
Printing & stationery		
Office equipment depreciation		
Audit, accounting fees		
Bank charges		
Trade subscriptions		
Other administration expenses		
Total		100

7.6. Insurance overhead	$	%
Manufacturing		
Distribution		
Selling		
General		
Total		100

7.7 Summary		$	%
Total production (sales)			100
Prime costs	Direct materials		
	Cutwork		
	Direct wages		
	Total prime costs.		
Gross margin			
Overheads	Manufacturing		
	Distribution		
	Selling		
	Administration		
	Insurance		
	Total overhead		
Net profit for comparison with total assets.			

8. Pricing

Please indicate your average ex-factory prices for the following:

Dining-room chair $..... Dining-room table $.....

Show-wood armchair $..... Sideboard $.....

Wardrobe (solid wood) $..... Wardrobe (plywood)$.....

Chest of drawers $..... Dressing table $.....

Executive desk $..... Other (specify) $.....

Name:..... Signature:.....

Designation:..... Date:.....

2. Questionnaire Returns Analysis

No. issued 21 — No. Returned 15

1.6	Type of business	Manufacturer/Retailer	8
		Manufacturer/Exporter	9
1.7	Legal status	Private Limited Company	10
		Sole Proprietor	2
		Partnership	2
1.8	Capital	Indicated authorized	G$ 3,715.000
		Indicated paid-up.	G$ 595.000
1.9	Ownership	Local	100%
1.10	Employees	Office	45
		Production	709
1.11	Gross sales	Domestic	G$ 9,077.000
		Exports	G$ 583.500

2.1 Products — Type	Frequency
Solid wood furniture	9
Panel furniture	2
Upholstered furniture	6
Bedding	2
Cane furniture	2
Furniture parts	6
Outdoor furniture	3
Domestic woodware	4
Wooden toys	2
Pre-fabricated housing	3
Doors and windows	6
Parquet strip flooring	2
Joinery parts	6
Mouldings	6
Turned parts	6

Type	Frequency
Pallets.	5
Box crates.	2

2.2 Product specification

Own design	13
Ex-catalogue	7
Customer design	13
Designer	1
Architect	3
Standard specification	4
Copy	3

2.3 Quantities produced

Single items	9
Batch production	8
Continuous production	5

2.4 Delivery period Average weeks 8

3.1 Timber species used

Crabwood	10
Mububalli	10
Simarupa	10
Purpleheart	9
Silverballi	7
Wamara	7
Locust	7
Kabukalli	5
Determa	4
Shibadan	4
Brown Silverballi	4
Tauroniro	4
Tatabu	4
Red Cedar	3

	Mora	3
	Greenheart	3
Annual input	3.6 m.b. ft	
Average price b.ft	G$ 3.25	

3.2

Timber species	Supply	Working characteristics
Crabwood	Fair	Good
Hububalli	Fair	Good
Simaruba	Good	Good
Purpleheart	Poor	Good
Silverballi	Good	Good
Wamara	Poor	Fair
Locust	Fair	Good
Kabukalli	Good	Good
Determa	Poor	Good
Shibadan	Fair	Fair
Brown Silverballi	Poor	Good
Tauroniro	Fair	Good
Tatabu	Fair	Good
Red Cedar	Poor	Good
Mora	Poor	Fair
Greenheart	Fair	Good

3.3 End use of various species.

	Frequency					
Species	Furniture	Joinery	Pre-fab	Moulding	Flooring	Toys
Crabwood	10	8	1	5	-	1
Hububalli	11	9	2	2	-	1
Simaruba	7	6	-	4	-	1
Purpleheart	6	6	2	2	3	1
Silverballi	5	6	1	6	-	
Wamara	4	3	2	1	-	1

Locust	6	6	2	3	-	1
Kabukalli	5	3	2	1	-	1
Determa	3	4	-	1	-	-
Shibadan	1	3	1	-	1	-
Brown Silverballi	2	3	1	2	1	-
Tauroniro	2	2		2	2	-
Tatabu	1	2	1	2	2	-
Red Cedar	3	3	-	-	-	-
Mora	-	-	-	-	-	-
Greenheart	-	-	3	-	2	-

3.4 Other materials

Material	Local	Imported	Supply	Quality	Av. price/unit
Plywood	x		Fair	Fair	70 - 81
Plastic Laminates Laminates.		x	Poor	Good	225
Locks		x	Poor	Fair	8 - 80
Handles		x	Poor	Fair	2 - 6
Hinges		x	Poor	Fair	2.50 - 3.00
Castors		x	Poor	Good	30 - 45
Mirrors	x		Poor	Fair	140 - 220
Adhesives		x	Poor	Good	60 - 154
Sandpaper		x	Poor	Good	0.75 - 2.00
Oils		x	Poor	Good	
Stains		x	Poor	Good	4.95
Fillers		x	Poor	Fair	12.00
Lacquers		x	Poor	Fair	1.40 - 2.80
Nails	x		Fair	Fair	4.80 - 6.80
Pins		x	Poor	Good	

Materials	Local	Imported	Supply	Quality	Av. price/unit
Screws		x	Poor	Good	8 - 21
Staples	x	x	Poor	Fair	7 - 9
Upholstery Covers.		x	Poor	Good	40
Foam	x	x	Poor	Fair	100 - 250
Other fillings		x	Poor	Good	
Springs		x	Poor	Good	40 - 100
Webbing		x	Poor	Good	
Fasteners		x	Poor	Good	15

3.5 Raw materials supply problems 1. Local

Problem	Order of importance
Irregular availability	1
Fluctuating price	3
High cost	2
Unsuitable dimensions	4
Quality not conform to specification	5
Unfavourable comparison with imported materials.	5
Cumbersome government procedures & regulations.	6

3.6 Imported materials supply problems

Problem	Frequency
Restriction on imports	1
High import tariff and taxes	5
Fluctuating prices	3
Long delivery time	5
High prices	2
Cumbersome import procedures & regulations	4

4.1 Buildings

Purpose/location	Frequency
Timber storage	12
Machining	11
Assembly	9
Finishing	8
Upholstery	5
Dispatch	5
Product development	1
Machine/tool maintenance	5
Material storage	4
Storage, work-in-progress	3
Expansion plans	7

4.2 Machinery and equipment.

Process	Frequency	Condition
Cross-cutting	16	Fair - Good
Band-sawing	19	Fair - Good
Ripping	19	Good - Fair
Planing & Thicknessing	12	Good - Fair
Planing & Moulding	4	Fair - Good
Turning	18	Good - Fair
Mortising	5	Good - Fair
Tenoning	-	
Dovetailing	-	
Boring	7	Good - Fair
Drilling	17	Good - Fair
Sanding	8	Good - Fair
Routing	1	Good

Process	Frequency	Condition
Dowel-making	1	Good

4.3 Ancillary production equipment. (1)

Equipment	Frequency	Condition
Dust exhaust system	2	Good
Compresser	10	Fair - Good
Compressed air system	1	Fair
Soray booths	-	-
Spray guns	10	Fair - Good
Pneumatic tools	18	Fair - Good
Power tools	24	Fair - Good
Internal transport	2	Fair - Good
Spares and accessories	2	Good
Tool maintenance	4	Good - Fair

4.4 Ancillary production equipment. (2)

Equipment	Frequency
High speed steel cutting tools	9
Tungston carbide tipped cutting tools	3
Pressure impregnation plant	-
Kiln-drying plant	1

	Good	Fair	Poor
Supply of fuels and lubricants	2	1	7

	G.E.C	Diesel	Gasoline
Source of power	All		
Cost of power per month.	G$ 3,600 - 50		

4.5 Problems in supply of machinery and equipment.

Problems	Order of importance
Shortage of foreign exchange	1
High prices	5
Restriction on imports	2
Long delivery time	6
Cumbersome import procedures/regulations	3
High import tariff and taxes	4

Problems in capacity under utilization

Problems	Order of importance
Insufficient domestic demand	4
Insufficient overseas demand	4
Shortage of raw materials	1
Shortage of spares and accessories	3
Lack of working capital	3
Lack of adequate power	2
Non-availability of skilled labour	5
Non-availability of unskilled labour	5

5.1 Management and supervision

Function	Frequency	Gen. Education	Technical Training
Owner/Manager	9	9	2
General Manager	3	3	-
Production Manager	3	3	1
Marketing/Sales Manager	2	2	2
Finance & Admin. Manager	1	1	1
Production Supervisor	9	9	-
Machine maintenance Supervisor.	7	7	-

Management employment constraints

Constraint	Order of importance
Shortage of trained managers	1
Emigration	2
High salaries sought	3
Other industry competition	4
Unattractiveness of wood industry	-
Lack of job security	5

5.2 Supervisors/foremen

Location/activity	Frequency
Timber yard	6
Drying kiln (s)	-
Pressure impregnation plant	-
Break-down mill	1
General machining	3
Assembly/joinery-furniture	4
Finishing (lacquering)	3
Sanding	2
Upholstery	2

5.3 Management training

Organiser	Frequency
Guyana Management Institute	3
Government Technical Institute	1
Guyana Manufacturers Association	5
University of Guyana.	1
UNIDO	1
ITC (UNCTAD GATT)	-
Others	3

5.4 Management systems and procedures

Activity	Frequency
Production planning	5
Series production	1
Product costing	7
Quality control	7
Piece work	8
Incentive bonus schemes	7
Work study	3
Marketing	1

5.5 Labour

	Department/Section	Male	Female
1.	Timber yard	47	5
2.	Pressure imoregnation	-	-
3.	Kiln drying	2	-
4.	Break-down mill	2	-
5.	General machining	142	6
6.	Sanding	37	7
7.	Furniture assembly	47	-
8.	Joinery assembly	39	1
9.	House element assembly	4	-
10.	Surface finishing	2	-
11.	Cutting and sewing	8	4
12.	Upholstery	7	-
13.	Cane work	23	5
14.	Others	31	11

5.6 Education and training

	Frequency	
General education	Primary 12	Secondary 2
Technical education		1

5.7	On the job training	12
	Technical Institute training	3

		Male G$	Female G$
5.8	Hourly/daily wage rate (flat)	13 - 35	13 - 24
	Overtime rate	Flat rate x 1½	
5.9	Normal working week (hours)	40 - 44	
	Average overtime (hours)	5 - 20	

5.10 Contract workers

No. Male 48 No. Female 7

Average weekly earnings: Male: G$ 70 - 300 Female: G$ 75 - 80

Method of payment: Cash.

6. Marketing and Sales

6.1 Quality available for export. G$ 500,000

6.2 Delivery period. 6 - 12 weeks.

6.3 Quotations F.O.B 7 C.I.F 5

6.4 Terms of payment: Letter of Credit and sight Draft.

6.5 Ports of shipment: Georgetown.

6.6 Total exports (1984) G$ 441,500

Main markets:

6.7	Sales aids	Frequency
	Samples	6
	Catalogues	2

	Sales aids	Frequency
	Photos	5
	Price list	8

6.8	Packaging materials	
	Nature	Wood and Polythene
	Availability	Unsatisfactory
	Quality	Fair

	Export constraints	Order of importance
	Lack of market information	1
	Discrimination tariffs	9
	Lack of market demand	8
	High import tariffs	7
	Lack of trade contact	2
	Non tariff barriers	7
	Low prices	7
	Payment problems	5
	Inadequate shipping services	3
	Quality requirements too demanding	7
	High shipping costs	4
	Restrictive import regulations	6

	Areas of export assistance required	Order of importance
	Market information	4
	Trade contact	1
	Export incentives	6
	Selling mission	9
	Market survey	6
	Reduction in taxes/duties	11

Areas of export assistance required	Order of importance
Export finance	3
Export management training	8
Raw materials	2
Product adaptation	10
Packaging	12
Product design	7
Improvements in production techniques	1
Improvements in quality	2

6.11 Joint venture agreements

Nature required	Frequency
Management	9
Finance	8
Marketing	9
Technology	8

6.12 Market diversification

Location	Frequency
Caricom	6
United States of America	5
Canada	3
French Antilles	1
Venezuela	1

6.13 Financial assistance

Nature required	Frequency
Raw materials	12
Export credit	6
Machinery	12
Additional working capital	5
Joint venture financing	7
Expansion	9

Annex 3

Firms and organizations that co-operated with the consultant in his field of work

1. Guyana Forestry Commission.
   1 Water St., Kingston,
   Georgetown.
   - Furniture: Joinery.

2. Mishore Furniture Factory.
   337 Lusignan West, E.C.D.
   - Furniture: Joinery.

3. M. Persaud Furniture Establishment
   25 Saffon St, Georgetown.
   - Furniture: Joinery: Upholstery.

4. Walvis & Sons Woodworking Establishment.
   24 West Ruimveldt, Georgetown.
   - Furniture: Joinery: Upholstery.

5. Fries Furniture Manufacturing Establishment.
   38 Industrial Site, Ruimveldt,
   Georgetown.
   - Furniture: Joinery: Upholstery.

6. A.H. & L Kissoon Ltd.
   Camo & Robb Street, Georgetown.
   - Furniture: Joinery: Upholstery.

7. Aziz Bacchus & Co. Ltd.
   Anna Regina Essequibo, Guyana.
   - Furniture: Joinery: Upholstery.

8. G. Singh & Sons Manufacturing.
   Sub Lot A1 Area K, Enmore,
   East Coast Demerara.
   - Furniture: Joinery: Upholstery.

9. Klass Manufacturing Establishment.
   Good Hope, East Coast Demerara.
   - Furniture: Joinery: Upholstery.

10. Ramroop Furniture Establishment.
    15 Lombard Street, Georgetown.
    - Furniture: Joinery: Upholstery.

11. N.C.E. Screen Printers Ltd.
    6-8 Water & Schumaker St,
    Georgetown.
    - Toys: Furniture: Joinery: Upholstery.

12. Coal Arts & Craft Centre.
    Beterverwagting
    Industrial Estate,
    East Coast Demerara.
    - Furniture: Joinery: Upholstery: Domestic Woodware & woodcraft.

13. Ideal Builders & General Contractors Ltd.
    88 Smyth & Leopold Street,
    Georgetown.
    - Prefab Buildings: Joinery: Furniture.

14. Twiga Engineering & Construction Company.
    36 Robb Street, Lacytown,
    Georgetown.
    - Prefab Buildings: Joinery: Furniture.

15. Carib Craft.
    Lama Avenue B.A.P, Georgetown.
    - Cane Furniture.

16. Liana Manufacturing Company.
P.O. Box 10731
Georgetown.

- Cane Furniture.

17. Shurland Case & Pallet Manufacturers Ltd.
36 Industrial Site, Ruimveldt.

- Case: Pallet: Broom Sticks.

18. Plywood Industries Ltd.
Coverden, East Bank Demerara.

- Plywood Manufacture.

19. Seals & Packaging Industries Ltd.
Farm, East Bank Demerara.

- Barrel Furniture.

20. Precision Woodworking Limited.
35 Industrial Estate, Ruimveldt.

- Furniture Components.

21. Rovans Furniture Manufacturers Ltd.
5A Water Street, Georgetown.

22. Guyana Timbers Ltd.
Houston, East Bank Demerara.

- Sawmilling.

23. Willems Timber & Trading Company.
7 Water Street, W/Rust.

- Sawmilling.

ORGANIZATIONS

24. Guyana Forestry Commission
1 Water St, Kingston.

25. Ministry of Forestry.
1 Water St, Kingston.

26. Export Promotion Council.
Home Stretch Avenue,
Georgetown.

27. Guyana Manufacturing & Industrial Development Authority.
237 Camp Street,
Georgetown.

28. Caricom Secretariat.
Consultants (Irish Export Board).
Bank of Guyana Building,
Georgetown.

29. Government Technical Institute.
Wooldord Avenue, Georgetown.

30. Guyana Management Institute.
Diamond, East Bank Demerara.

31. Guyana Manufacturers Association.
Church Street, Georgetown.

32. Albert Rodrigues Associates.
135 Robin's Place, West
B.A.P, Georgetown.
(Architects).

33. George Henry Associates.
Middle Street, Georgetown.
(Architects).

Annex 4

Additional design recommendations and some suggested sketch designs

1. To use the best available timber species which is properly kiln-dried.

2. To exploit the use of solid wood by emphasising its character in more detailed and lighter mouldings e.g. astragal mouldings for glass panel doors.

3. To soften all exposed edges by using a good radius.

4. To improve sanding and finishing techniques and to achieve a smoother feel and richer look in keeping with the fine nature of such materials. It should be noted that all sanding should be done before assembly.

5. To work to stringently close tolerances through the use of hard-wearing and long-lasting machining jigs and formers.

6. To place much more emphasis on mechanized processing particularly in relation to door drawer and frame (tables and chairs) production.

7. To increase added value by wood carving, inlaying and wood turning wherever appropriate.

8. To ensure that in fixing solid wood members adequate provision is made for the natural movement of the material by contraction and expansion.

9. To improve the proportions and comfort of all chairs.

10. To provide a wider choice of chairs to complement bedroom, living-room and dining room furniture, Each chair frame should be capable of having three different backs, thereby effectively altering its appearance, e.g. upholstered panel, vertical or horizontal rails.

11. To provide a selection of tables to suit various needs, such as gate-leg, drop-leaf, draw-leaf extension etc.

12. To increase the number of occasional items e.g. wine tables, stools, writing tables, lamp standards and tables particularly where solid wood is a major component.

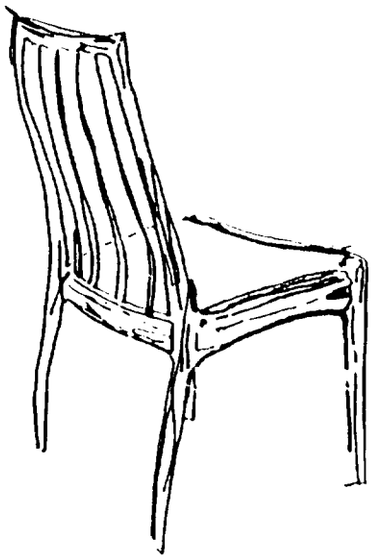
13. To design whenever possible for greater versitality in usage.

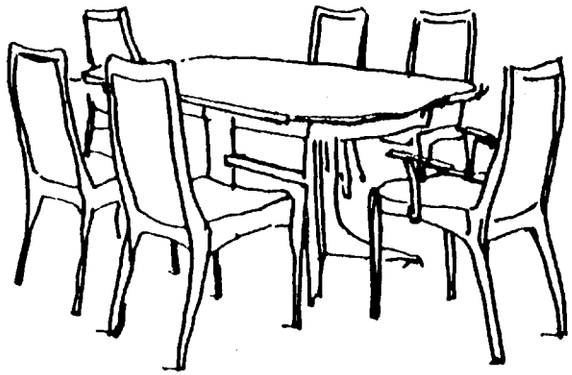
14. To always work from full-sized, fully detailed working drawings.

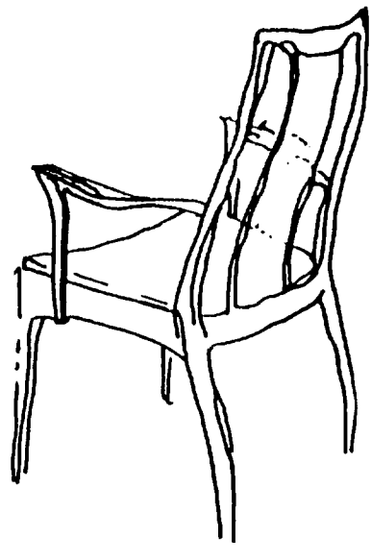
Figures 3 - 10 provide some suggested design ideas for fully-assembled furniture and ready-to-assemble components which would be suitable for export.

Additional design sketches

Fig. 3: Dining chair ideas

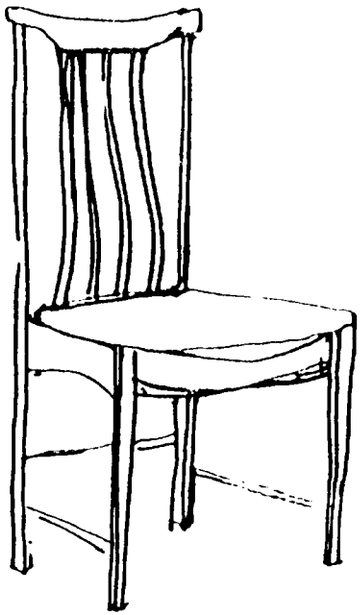


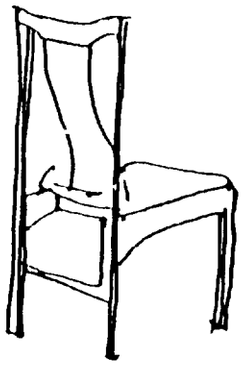


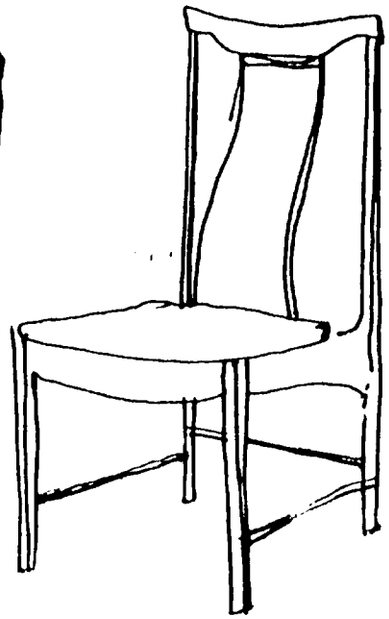


Additional design sketches

Fig. 4: Dining chair ideas
(vertical leg, square frame)

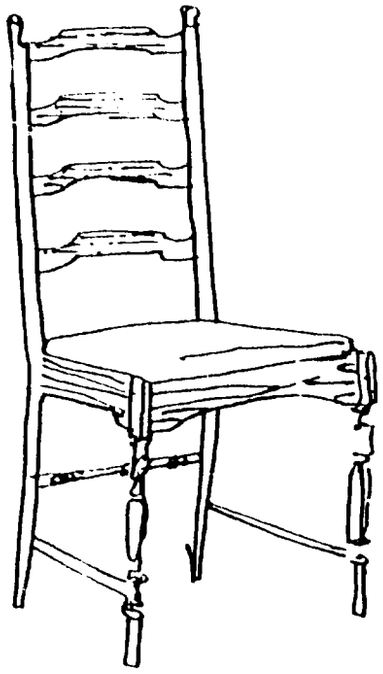


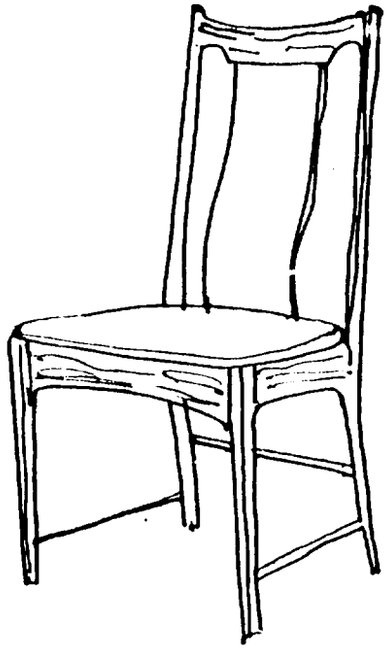




Additional design sketches

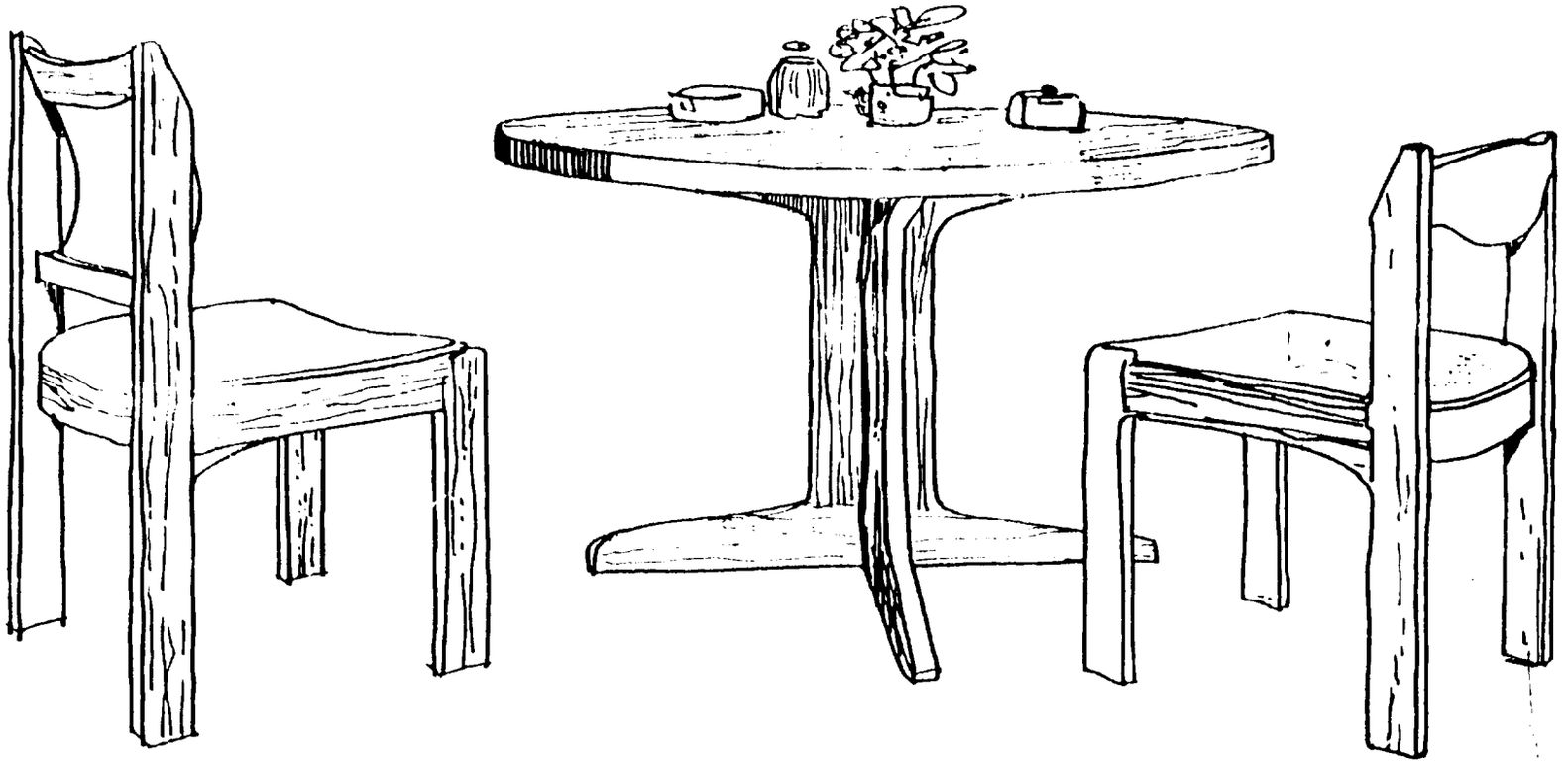
Fig. 5: Dining chair ideas (semi-reproduction styles)





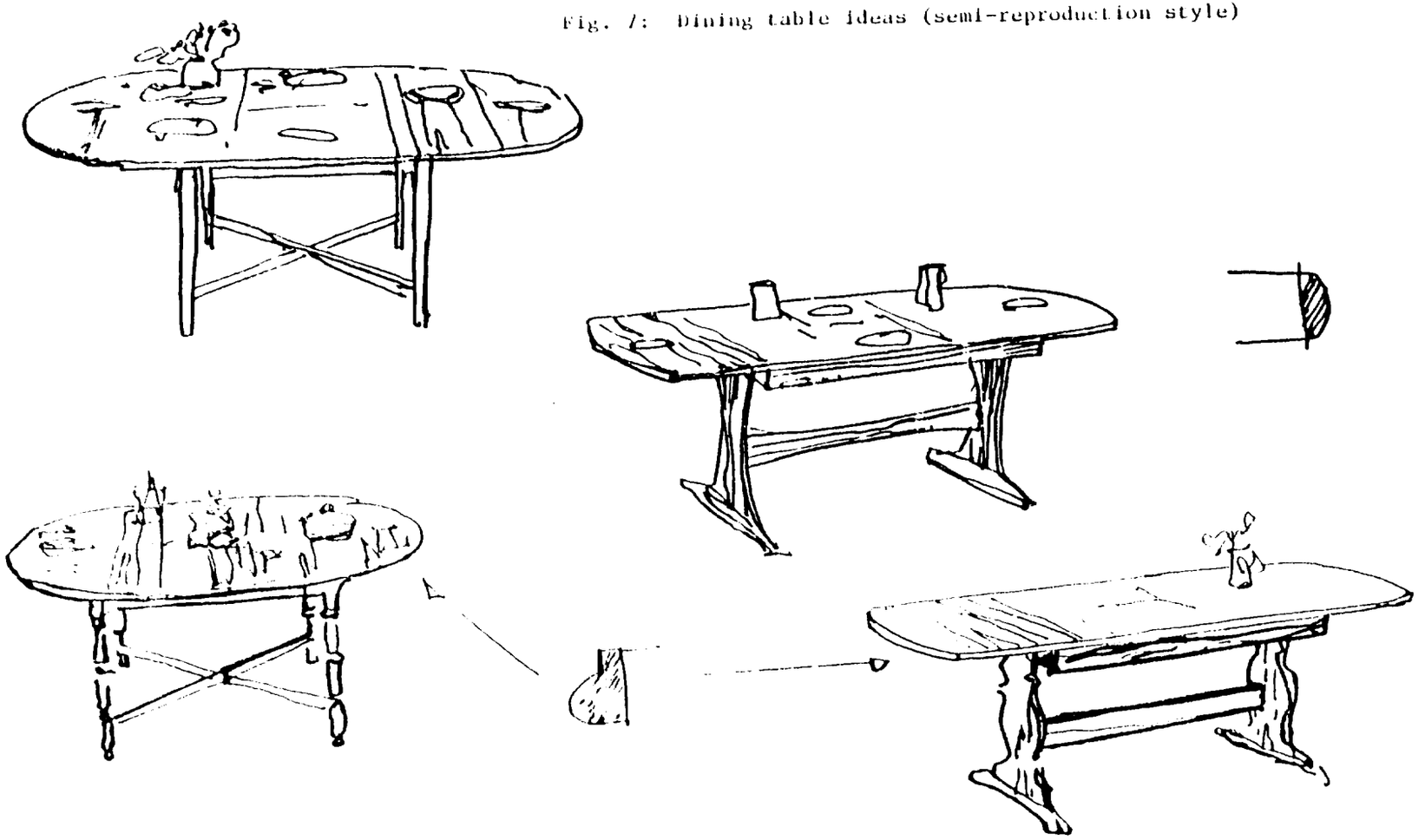
Additional design sketches

Fig. 6: Fixed top dining OR games table and chairs (KD construction)



Additional design sketches

Fig. 7: Dining table ideas (semi-reproduction style)

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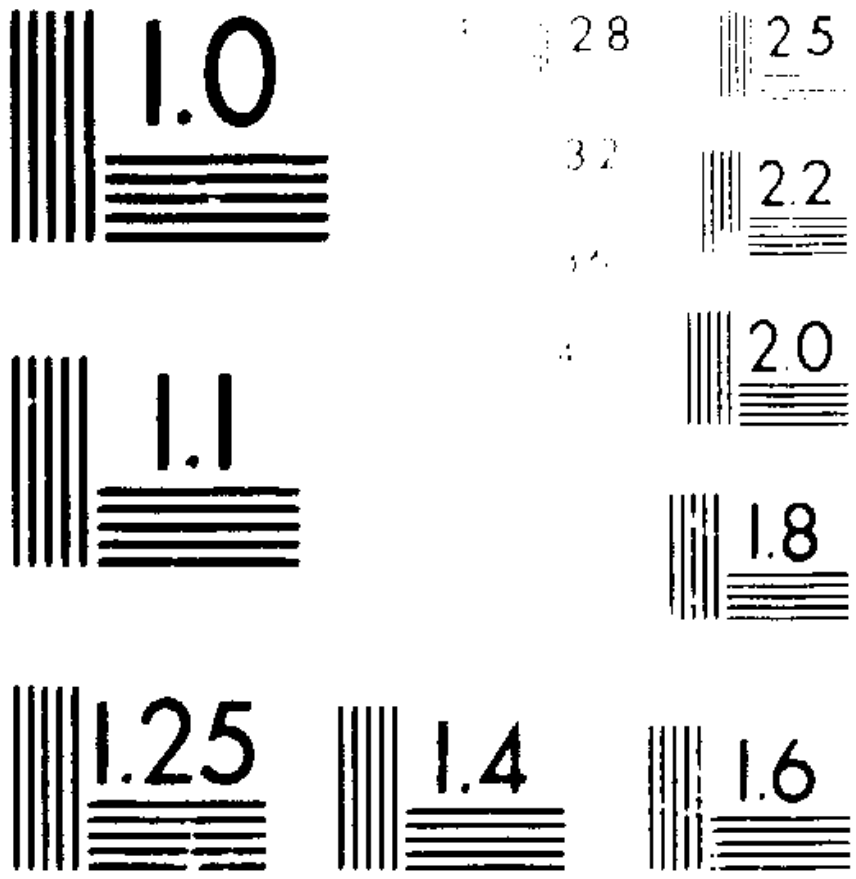
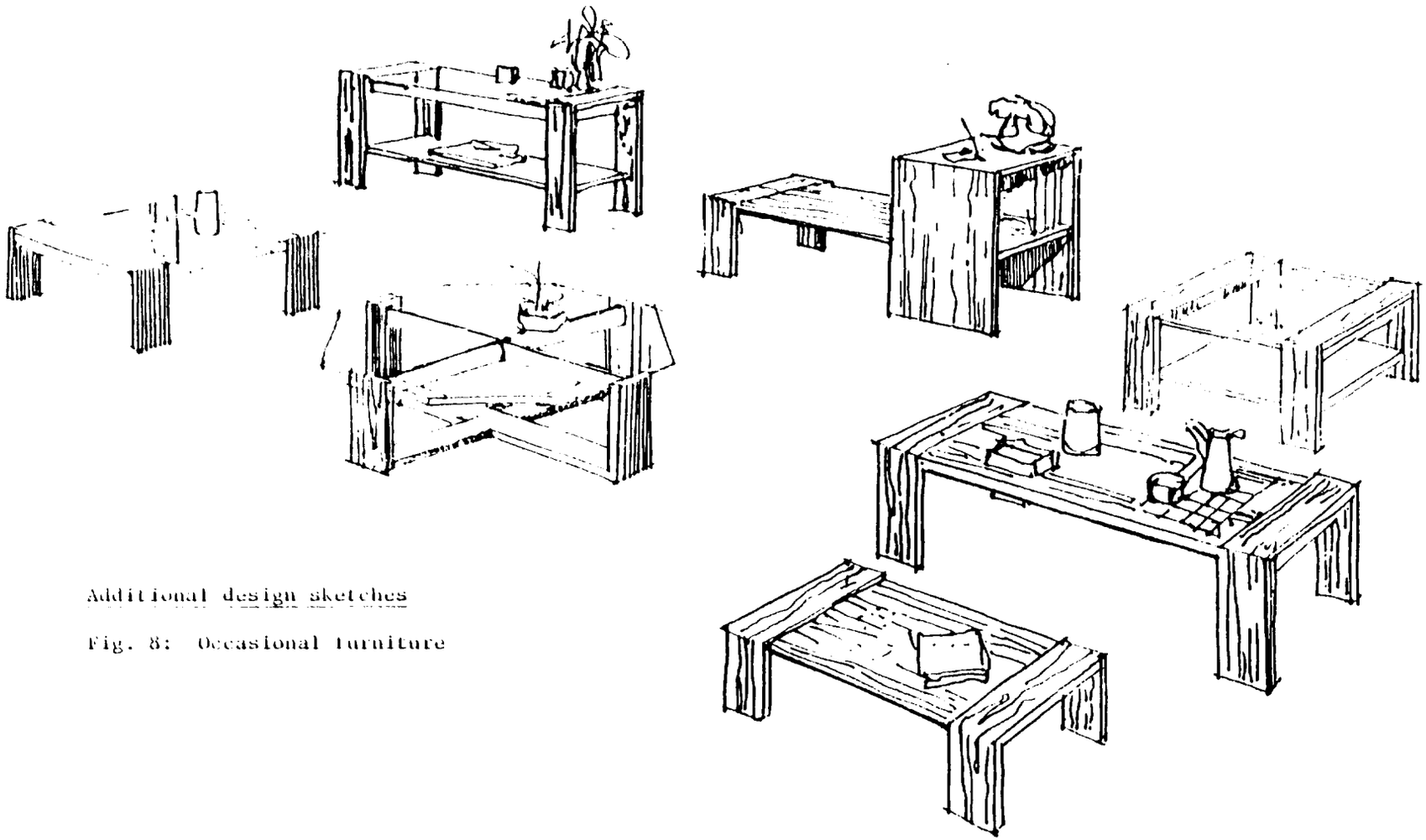


MICROCOPY RESOLUTION TEST CHART



Additional design sketches

Fig. 8: Occasional furniture

Fig. 9 : Examples of various types of turnery

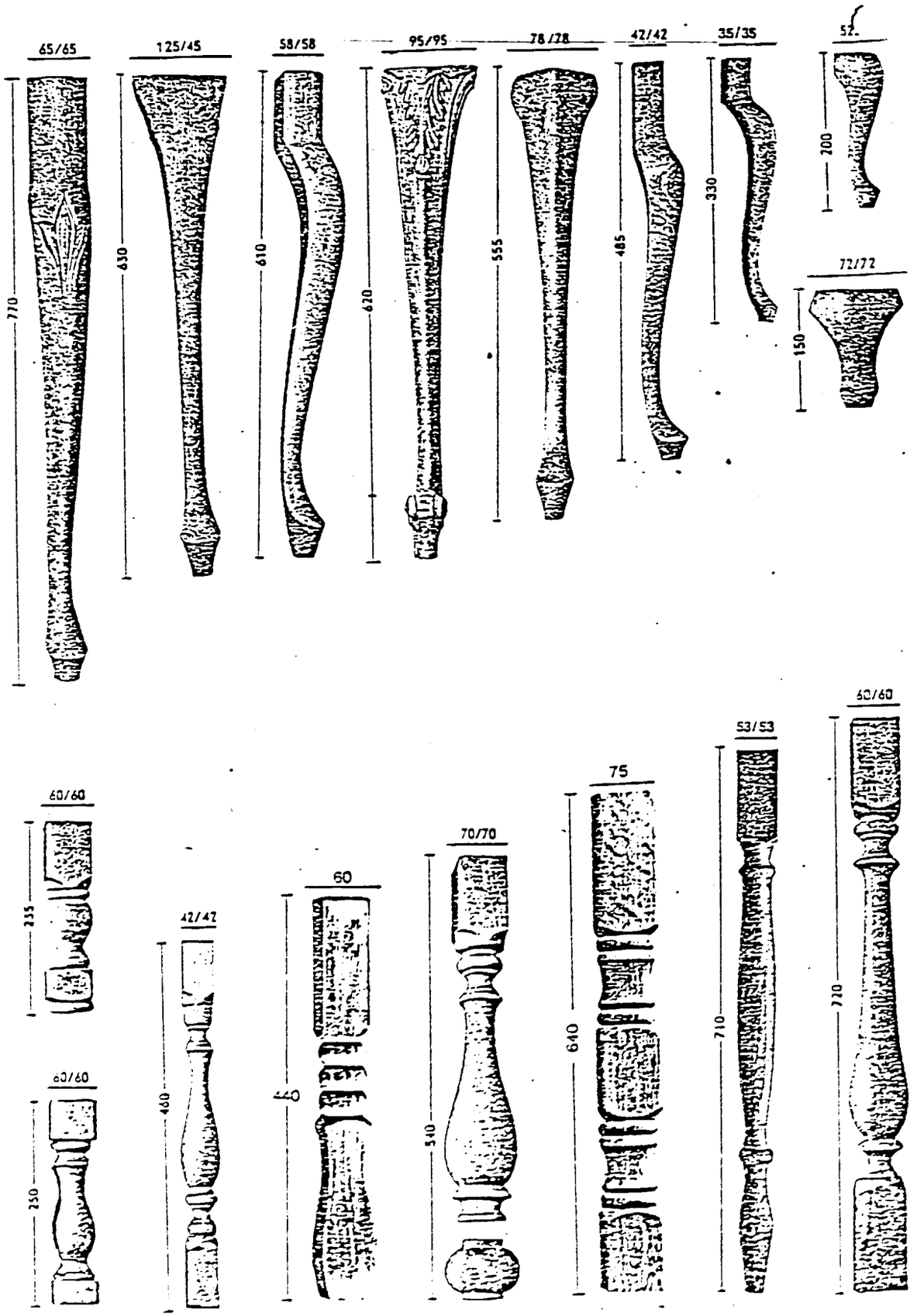
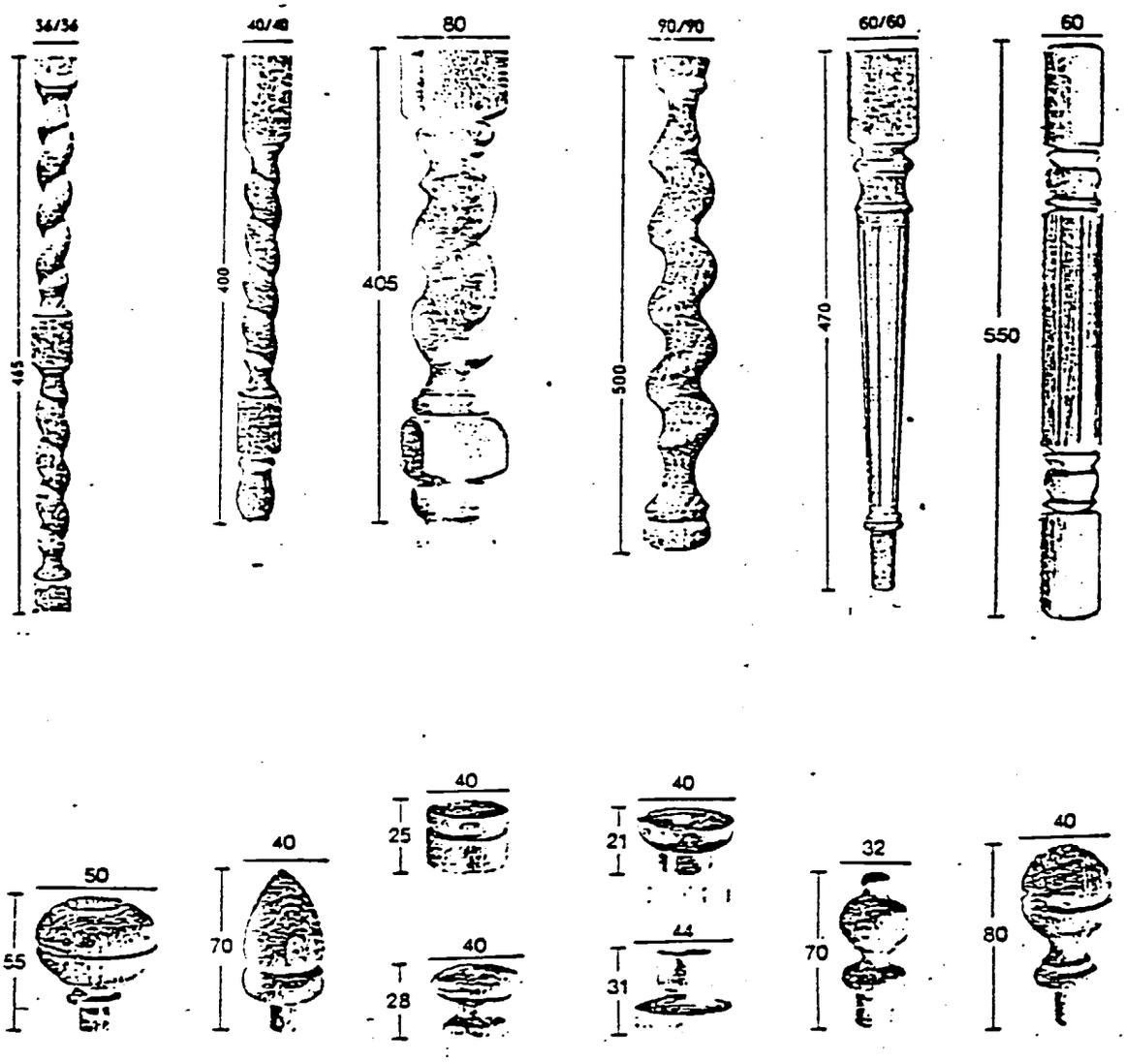


Fig. 10: Examples of various types of turnery



Annex 5

Outline of plant and equipment for solid wood furniture and joinery processing

I Solid wood processing

a) Production of straight tenoned components

1. pneumatic circular swing-saw for cross cutting
2. multi-blade circular saw, 300 mm working width for rip sawing
3. moulding machine, 170 mm working width, with seven cutterheads
4. automatic double-head tenoner with rounding off unit

b) Production of non-contoured components and other operations

5. 2 bandsaws, 900 mm diameter wheel
6. surface planer, 520 mm working width
7. thicknessing machine, 630 mm working width
8. 2 spindle moulders, 3 speeds, 10 000 rpm
9. double end sawing machine
10. automatic sawing, boring, shaping machine
11. automatic double-head mortising machine
12. automatic gang mortising machine with three independent units
13. high speed router with floating head
14. semi-automatic lathe with centering device
15. semi-automatic leg beading machine
16. sanding machine with belts above feed table, 1100 mm working width
17. 2 horizontal sanders with a 4900 mm belt
18. brush sander with abrasive holder
19. bench sander
20. dust exhaust system for sander

21. automatic dowel-making machine

22. automatic shaper for corner blocks

c) Assembly and finishing

23. pneumatic cramps for pre-assembly

24. cramp for assembly

25. hydraulic two-platen cold press, size 2500 x 1300 mm

26. 4 dip tanks

27. spray booths, 4000 x 2200 x 2000 mm

28. de-nibbing benches

29. 4 air spray guns

30. final fitting benches

d) Product development

31. universal woodworking machine

32. single table mortising machine

33. automatic single table tenoning machine with rounding off unit

34. bandsaw

35. assembly benches

e) Maintenance room

36. grinding machine

37. 3 kw portable welders

38. drill press

39. knife sharpener

40. universal tool sharpener

41. bandsaw sharpener with setting attachment

42. bandsaw butt welding machine

f) Power plants

43. chip and dust exhaust system with 2 collectors, 1 silo (capacity 315 m^3), 2 electric exhausters, filter system

44. compressor station consisting of a rotary compressor (capacity 1000 l), air maintenance and cooling system

45. transformer unit and distribution station

46. compressed air-line system

g) Tools and accessories

47. various tools for the setting up of machines, tool maintenance, assembly and sanding tables, benches and bench supports for components.

Annex 6

Details of additional equipment required by the Forest Industries Development Unit.

1. Machine tool and maintenance equipment.

	US$
Expendable Equipment	
1. One Power Drill:	
- Two speeds for wood and metal boring	
- Typical equipment:	
BLACK & DECKER, mod. SPK - 2513 (FRG)	250
2. One Dial type set gauge (for measuring tooth set metric)	
- Typical equipment:	
VOLLMER, mod. MU-10-U (FRG)	53
3. Two Vernier caliper	
- Reading up to 150 mm (dial type)	
- Typical equipment: VOLLMER, mod. MW-10-U	70
4. Two Micrometer	
- Reading up to 25 mm	
- Typical equipment:	
VOLLMER, mod. MW-11-U	94
5. Two Protractor	
- Range up to 180°	
- Length of leg: 150 mm	
- Typical equipment:	
VOLLMER, mod. MW-13-U	66

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US$

6. Two Setting tools (for circular saws)1/

- Single handled lever-type setting tool with slots for 12 - 19 gauge blades or similar range

- Double handled lever-type setting tool with slots for 9-11 gauge blades or similar range

- Typical equipment:

VOLLMER, 20

1/ In addition to existing setting machine, VOLLMER, mod. Adn/v.

7. One Ancillary tools and supplies Set

6 Silicon carbide dressing sticks, size approx, 25 x 25 x 150 mm

12 Mill saw files with rounded edges, 300 mm long

12 Slim taper 12 mm or 15 mm square files second cut 250 mm length

2 Metric feeler gauge set. Reading 0.05 - 2 mm

6 Grinding goggles with safety lenses

4 Tins (500 grams) Brazing flux "Easyflow"

4 Tins (35 grams) Silver solder size 12mm x 0.09mm

4 Tins (35 grams) Silver solder size 16mm x 0.08mm

- Typical equipment:

VOLLMER (FRG) 350

8. One Angle grinder

(lightweight, single phase, 220 volts, 50 cycles)

- Spares:

a) 24 pcs, 100 mm dia. resin-bonded grinding disks suitable for grinding steel.

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		US$
8.	b) 2 pcs, rubber backing pads for use with abrasive paper discs	
	c) 100 pcs, abrasive paper disks 80 grit aluminimum oxide	
	- Typical equipment:	
	BLACK + DECKER, BOSCH, MITSUBISHI (FRG, JAPAN)	350
9.	One Chain saw grinder (manual)	
	- With 12 spare files	
	- Typical equipment:	
	DOLMAR (FRG)	250
10.	Other tools and supplies	
	For tool maintenance workshop	1,000
11.	Office supplies	500
	Sub-total Expendable Equipment Component	3,353

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Non-Expendable Equipment	US$
1. One Automatic knife grinder	
- for knife length up to 600 mm	
- simultaneous sharpening of up to 4 knives	
- wet grinding	
- recommended model and supplier:	
Model V8C LOROCH (F.R.G.)	3,500
2. One Universal tool grinder	
- with attachments for grinding following HSS and carbide cutters minimum and maximum wheel diameter 75:150 mm	
- attachments for grinding of boring, drilling and routing bits as well as cutterblocks	
1- Moulding cutters (bore dia. 30 mm)	
2- Routing cutters	
3- Boring and slotting cutters with plain and threaded shank (Thread M10)	
4- Straight knives of length up to 120 mm	
- Six sets of standard and diamond grinding wheels	
- Typical equipment:	
GRIFO, model G-10-N with following accessories Ref. Nos. G-B-E-E1-E3-C (for thread M 10) -F-GG-GP-I-Y-IA-IR	8,000
3. One Automatic grinder for carbide tipped circular saws	
- for grinding of tooth front and back	
- Six of each type grinding wheels	
- Typical equipment:	
STEHLE, model 600 T	3,500

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US$

10. One Bandsaw shears

- For blade width up to 200 mm
- Typical equipment:
  VOLLMER, model No. A-360 300

11. One Bandsaw swaging clamp

- Capacity: 50 up to 200 mm minimum blade width
- Clamping jaws: 800 mm long mimium
- Blade height adjustment
- Typical equipment:
  VOLLMER, model No. 1302 420-

12. One Lightweight oxy-acetylene welding equipment (set)

- For: 1) Repairing of cracked blades;
  2) Weld-jointing of blades instead of brazing.
- One lightweight torch with nozzle sizes 1 - 10, complete with nozzle cleaners, spanners and storage box
- One red lightweight connecting hose approx. 5 metres long
- One acetylene regulator, range up to 15 lb/in^2
- One oxygen regulator, range up to 15 lb/in^2
- One gas economiser and all necessary connectors
- Two spark lighters
- Two sets spanners and keys
- Six welding goggles
- Five kg 3% nickel steel welding rod 1.6 mm dia.
- Typical equipment:
  B.O.C. Ltd., (UK) 1,060-

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US$

4. One Manual side grinder for carbide tipped circular saw

- Six of each type grinding wheels
- Typical equipment:

VOLLMER ZORNHAN, model VODO L-600 3,300

5. One Brazing equipment for carbide tipped circular saws:

- Typical equipment:

VOLLMER ZORNHAN, model VODO L-600 2,400

6. One Manual bandsaw setting machine

- Bandsaw blade width up to 45 - 50 mm
- Tooth pitch 3 to 24 mm
- Centering adjustment for blade thickness
- Additional raker set equipment
- Typical equipment:

VOLLMER, AN-3-1A 400-

7. One Device for setting and balancing cutter blocks:

- Typical equipment:

WACO (Sweden), model SIBA 1,000

8. One knife balancing stang:

- For balancing loose knives in parts before mounting on cutterblocks
- Typical equipment:

ROBINSON, model ZX 500-

9. One General purpose bench grinder

- For off-hand grinding
- Sliding attachment for precision sharpening of chisels, and knives of hand planers
- Grinding wheels supply for two-year operation
- Typical equipment:

VOLLMER, model No. 2310 1,000

	US$
13. One Butt welding machine	
- For blade width up to 50 mm	
Typical equipment:	
VOLLMER, model BS 2	1,800
14. One Automatic sharpening machine for circular saws and narrow band saws	
- For circular saw dia. 100 to 600	
- Band saw width up to 60 mm	
- Bevel and straight grinding	
- Hook angle from -10^{o} to $+30^{o}$	
- Tooth pitch: 5 to 60 mm	
- Feeding speeds: 30 to 80 teeth/min	
- Tooth height adjustment: from 3 mm upward	
- Built-in cams for standard and hooked tooth types	
- With indexing device size I [1/]	
Grinding wheels for two-year operation	
Typical equipment:	
VOLLMER, model CNE	9,000
15. One Mobile pack saw with slide sweep	
- For packets 120 x 120 cm	
200 cm cutting length	
cutting tolerance + 1 - 2 mm	
Electric engine 10 HP	
3 x 220 volt 50 cycles	
Typical equipment	
R. PRINZ - KG Austria.	300.00
Sub-total Non-Expendable Equipment Components	36,460.00
Equipment supplies and spares for two-year operation. 15% of total cost.	

1/ Indexing plate will be purchased when project being implemented.

2. Kiln-drying equipment

Parts required for:

1 - Irvington/Moore temperature humidity recorder controller type TDVH serial No. 15532, model APC 2 tube gauge recorder range 60^{o} - 200^{o}FHT.

Description	Part No.	Quantity	US$
Recording spiral assemblies	No. 423	1 - Dual dry bulb 85ft. long.	1,225.00
		1 - Wet bulb 70ft. long.	650.00
Recording chart	No. 6207	1000	125.00
Recording chart	No. 6237	1000	125.00
7D Electric clock	No. 801 - 3	1	94.00
Allen Bradley Pilot (Heavy) Duty 10 AMP Non Inductive 600 V AC. Series B. Tune Switch	No. 849A - ZDD 25.	1	168.00
			2,377.00

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3. Product development workshop

	US$
1. One Moulding machine for the Production of multigrooved dowels	
- recommended model and supplier	
model SP4R with four-head blocks and two feeds	
FESTO (F.R.G.)	3,300
2. One Dowel cutting and chamfering machine (for 6-18 mm diameter dowels)	
- recommended model and supplier	
Model AA-200	
LOSER (F.R.G.)	5,000
3. Four Dowelling jigs	
- For large boards up to 460 mm wide	
- each with one set of sliding rods of lengths 30 and 460 mm	
- each with six spare drill bushing $\frac{1}{4}$" diameter.	
- recommended model and supplier	
Model 01040-R	
WOODCRAFT SUPPLY CORPORATION	900-
4. Four Dowelling jigs	
- for stock up to 50 mm thick	
- eight sets of spare bushing $\frac{1}{4}$"	
recommended model and supplier	
Model 09Q51-EA	
WOODCRAFT SUPPLY CORPORATION 313 Wenvale Avenue Woburn (Mass) 01888 USA.	300-

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US$

5. One Semi-automatic lathe

- with centering device.
- Typical equipment.

LIMA
LOCATELLI ITALMACCHINE
24048 TREVIGLO
(BERGAMO) ITALY. 8000.00.

6. One Multi-boring machine

- Multiple-spindle head for panel construction
- Five spindle head for solid wood construction
- Manual eccentric clamping.
- With 3 sets spare boring bits 10 mm diameter
- Typical equipment.

Enjen Mayer, model OBSH (FRG) 9000.00.

7. One Set spraying equipment

- Four spray guns suitable for experimenting with various types of wood finishes.
- One air compresser.
- One wall exhaust fan
- Air line complete of accessories
- Typical equipment

De Vilbiss. 9000.00.

8. Six Cabinet-making hand tools sets

- Typical equipment

ULMIA, model 402 4000.00.

9. One Heavy-duty power router.

- Typical equipment with standard attachments and spare HSS routing cutters sizes 4, 6, 8, 10, 12 and 16 mm diameter.
- Typical equipment

SCHEER, model HM 14. 900.00.

	US$
10. One Power band rig saw.	
- With saw wheels 700 mm diameter.	
- With blade width 65 mm	
- With refeed roller tables motor 50 HZ 3000 Rev/mm.	
- Typical equipment Wadkin Bursgreen, model PSR.	3000.00
11. One Rotary drill two speed	
- With drill chuck thread $\frac{1}{2}$" 20 UNF	
- with spindle bar 43 mm diameter.	
- Typical equipment BOSCH, model 1126	90.00
12. One Drywall screw driver	
- With single and variable speed	
- With tool holder $\frac{1}{4}$" internal hex	
With 2 sets HS 1:2:3 Phillip & Pozidriv Bits etc.	
Typical equipment BOSCH, model 1413.7	150.00
13. One Circular saw	
- With saw balde 230 mm diameter With 4 sets various cutting & Ripping chisel & Sullit blades.	
Typical equipment BOSCH, model 1566	250.00
14. One Orbital Sander	
- With base plate size 114 x 227 mm	
- Typical equipment. BOSCH, model #1288.9	150.00
15. One Obital Action Jigsaw	
- With cutting capacity maximum 60 mm	
With 4 sets scare blades T101D: T144D T244D	
Typical equipment BOSCH, model 1581	150.00

		US$
16.	One Heavy Duty Planer	
	- With planing width 75 mm	
	With 6 sets blades for rough and finish planing	
	Typical equipment	
	BOSCH, model 1590.1	270.00
17.	One Router	
	- With all attachments & accessories	
	Typical equipment	
	BOSCH, model P.C.F 52	300.00
18.	One Automatic Single-End Tenoning Machine	
	- With rounding-off unit	
	Typical equipment	
	Rye Engineering	6,000
19.	One Automatic Single-End Oscillating Morticing Machine	
	- With variety of morticing bits	
	Typical equipment	
	Rye Engineering	5,000
	Equipment supplies and spares for two-year operation 15% of total cost.	9,030
		69,290

Annex 7

FURNITURE AND WOOD INDUSTRY LITERATURE

I. Journals:

1. Furniture manufacturer (monthly)
Magnum Publication. Ltd., 110/112 Station Road, East Oxted,
Surrey, Great Britain.

2. Cabinet maker (weekly) and

3. Woodworking Industry (monthly)
Benn Brothers Ltd., 25 New Street Square,
London EC4A 3JA, Great Britain

4. Wood and Equipment News (monthly)
Westbourne Journals Ltd., Crown House, London Road,
Morden, Surrey SM4 5ER, Great Britain.

5. Furniture Design and Manufacturing (monthly)
Dun-Donnelley Publishing Corp., 222 S. Riverside Plaza,
Chicago, Il. 60606, U.S.A.

6. The International Journal of Wood Preservation
The Construction Press Limited, Lunesdale House,
Hornby, Lancaster LA2 8NB, Great Britain.

7. Annual Report of the British Furniture Manufacturer's Council
D.D. Mitchell, OBE, 17 Berners Street,
London W1P 4DY, Great Britain.

II. Publications issued by the United Nations Industrial Development Organization (UNIDO), P.O. Box 300, A-1400 Vienna, Austria

A. Studies and reports

1. Furniture and Joinery Industries for Developing Countries (Raw Material Inputs, pt.1: Processing Technology, pt. 2: Management Considerations, pt.3) (ID/108 Rev. 1 + Corr.)

2. Selection of Woodworking Machinery, Report of a Technical Meeting, Vienna, 18-23 November 1973 (ID/133)

3. Low-cost Automation for the Furniture and Joinery Industry (ID/154 Rev.1)

4. Wood Processing for Developing Countries. Report of a Worksnop Vienna, 3-7 November 1975 (ID/180)

5. Value Analysis in the Furniture Industry (ID/298)

6. Manual on Jigs for Furniture Industry (ID/265)

7. Manual on Upholstery Technology (ID/275)

8. Manual on the Production of Rattan Furniture (ID/299)

9. Adhesives in the Wood Processing Industries, Report of Workshop Vienna, Austria, 31 October - 4 November 1977 (ID/223)

10. Technical Criteria for the Selection of Woodworking Machinery (ID/247) contains the following relevant chapters:

I. Wood Characteristics Influencing the Selection of Equipment and Machining Operations (ID/WG.277/1 Rev. 1)

III. General Criteria for the Selection of Machines (ID/WG.277/3)

IV. Methodology for the Purchase of Woodworking Machines (ID/WG.256/26)

XVI. Industrial Production of Doors, Windows and Frames, (ID/WG.277 Rev.1)

XVII. Production of Chairs and Other Wood Components (ID/WG.277/2 Rev.1)

XVIII. Technology and Machinery for the Production of Casegood Furniture (ID/WG.277/8 Rev.1)

XIX. Selection of Equipment for Parquetry Production (ID/WG.277/15)

B. Guides to sources of information

1. Information Sources on the Furniture and Joinery Industry (UNIDO/LIB/SER.D/4 Rev. 1 + Corr. 1)

2. Information Sources on Industry Quality Control (UNIDO/LIB/SER.D/6)

3. Information Sources on the Paint and Varnish Industry (UNIDO/LIB/SER.D/18 - ID/180)

4. Information Sources on Woodworking Machinery (UNIDO/LIB/SER.D/31 - ID/214)

5. Information Sources on the Utilization of Agricultural Residues for the Production of Panels, Pulp and Paper (UNIDO/LIB/SER.D/35 - ID/234)

C. Documents prepared for workshops and expert group meetings

1. Quality Control in the Furniture Industry (ID/WG.209/24)

2. Quality Control Procedures and Equipment for the Secondary Woodworking Industries (ID/WG.151/30)

3. Timber drying (ID/WG.225/11)

4. Production of Solid Wood Furniture in Developing Countries: An Analysis of Alternatives (ID/WG.200/9)

5. Joinery Production in Developing Countries: An Analysis of Alternatives (ID/WG. 200/6)

6. Fibreboard Production in Developing Countries: An Analysis of Alternatives (ID/WG.200/5)

7. Particle Board Production for Developing Countries (ID/WG.200/31)

8. A basis for Establishing Criteria for the Choice of Processes and Equipment in the Saw Milling Sector (ID/WG.200/2)

9. Adhesives for Wood (ID/WG.200/3)

10. Production of Veneer, Plywood in Developing Countries: An Analysis of Alternatives (ID/WG.200/4 Rev. 1)

11. Furniture Upholstering for Developing Countries (ID/WG.200/11)

III. Books and pamphlets published by the Furniture Industries Research Association (FIRA), Maxwell Road, Stevenage, Hertfordshire SG1 2 EW, Great Britain

FIRA Bulletins
FIRA Research Notes
FIRA Technical Reports
Furniture Literature
Management Accounting
Methods Engineering
The Furniture Standards Handbook

IV. Irish Standard Specification - Furniture

Published by Institute for Industrial Research and Standards, The Industrial Research Centre, Ballymun Road, Dublin 9, Ireland.

Kiln Operator's Handbook

Published by Her Majesty's Stationery Office
49 High Holborn, London WC1, Great Britain.

V. Sawn Hardwood Grading System

Ministry of Technology, Forest Products Research Laboratory, Princes Risborough, Aylesbury, Bucks, Great Britain

VI. Timber Selection by Properties (quarterly)

The Species for the Job

Constance Webster

Distribution Unit, Application Services Division, Building Research Station, Garston, Watford WD2 7 SR, Great Britain

VII. Work Study (Fourth Edition)

R.M. Currie

Pitman Publishing Limited,
39, Parker Street, London WC2B 5PB, Great Britain.