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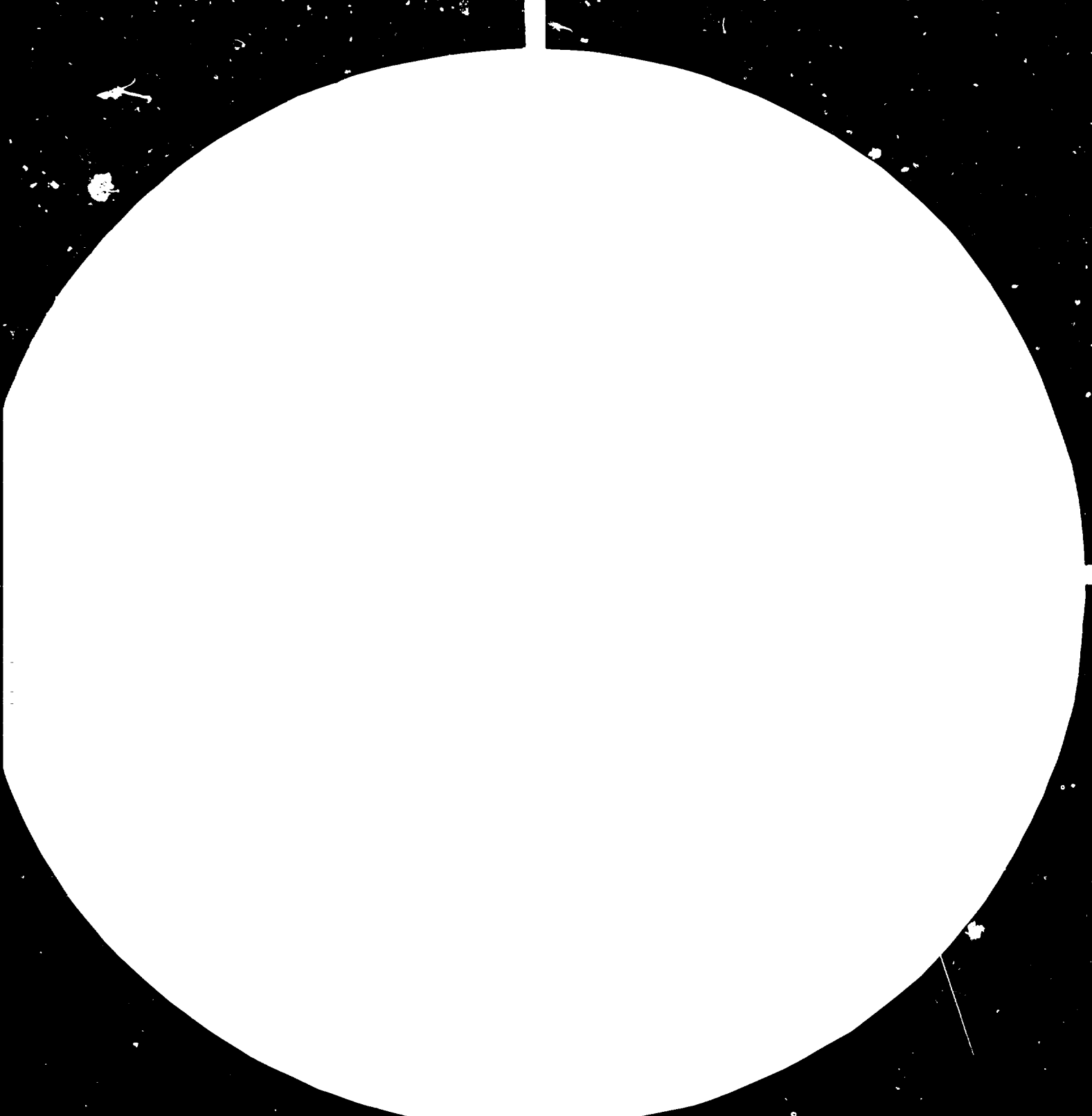
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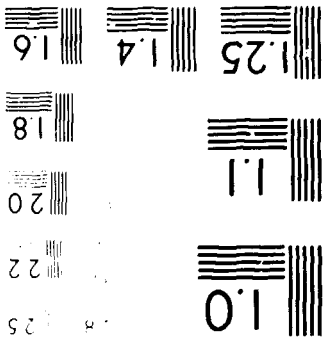
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DEVELOPMENT OF SECONDARY PROCESSING
IN THE WOOD AND WOOD PRODUCTS INDUSTRY
OF DEVELOPING COUNTRIES *

Discussion Paper

by

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DISCUSSION PAPER

1.0 INTRODUCTION

1.1 Background

In implementing the Lima Declaration of 1975, as endorsed by the UN General Assembly at its 7th Special Session in September, 1975, UNIDO has been convening Global Consultations on selected industries since 1977.

The First Consultation on the Wood and Wood Products Industry will be convened in Helsinki, Finland, in September 1983.

In preparation for this Consultation, a Global Preparatory Meeting has been scheduled to take place in Vienna, Austria from 24 to 26 January 1983.

1.2 Objectives of this Paper

Regional Preparatory Meetings on the industry were convened for Asia, Africa and Latin America in 1982. The current and future situations of the furniture and joinery industry, together with the other sectors of the wood and wood products industry of various countries within the three regions were presented and discussed during the three regional preparatory meetings. The discussions brought out problems affecting the development of the furniture and joinery industry in the developing countries. Corresponding solutions to these problems, which could form the basis for international and/or regional cooperation, were also proposed.

This paper seeks to crystallize the issues pertinent to the development of the furniture and joinery industry at the global level, to be used as basis for discussions in the Global Preparatory Meeting on the wood and wood products

industry (excluding the structural use of timber in construction).

2.0 THE FURNITURE AND JOINERY INDUSTRY IN DEVELOPING COUNTRIES

2.1 The Global Situation of the Industry

A proper perspective and adequate understanding of the constraints to the development of the furniture and joinery industry in developing countries today may be attained through summarizing its characteristics as brought out during the three regional preparatory meetings. The industry profile given below is typical of the present situation of the industry. However, it is recognized that there are some exceptions to the typical picture presented. These exceptions compose a very small minority in the industry and refer primarily to furniture and joinery factories operating at higher levels of technology by virtue of their being subsidiaries of multi-national firms engaged in the business or because the local firm operates under certain marketing joint-venture arrangements with furniture distributors in developed countries. Nevertheless, it is held that the following characteristics portray a realistic picture of the vast majority of furniture and joinery industries in developing countries today.

--- The industry is highly fragmented, composed of units in widely ranging sizes --- from a family-owned and operated shop employing less than 10 workers to big factories employing 300 or more workers. It is a common situation to find the combined outputs of small shops in one country equal only a small fraction of the output of the bigger and more modern factories ;

--- The existing technology levels in one country range from the hand tools stage to fully-mechanized and conveyORIZED factories which are equipped with specialized machinery supported by other industrial

auxiliaries needed to sustain volume production of better quality furniture and joinery products ;

- Product specialization and serial production of selected furniture and joinery products are normally found only in export-oriented firms. These firms usually have foreign marketing arrangements or are subsidiaries of multi-national corporations. The use of basic woodworking machines is generally confined to shops which serve the needs of the higher income segments of the population. Regrettably, however, these pieces of equipment are commonly used as tools, rather than as industrial machines, i.e., the machine serves the man instead of vice versa. This situation is a result of the type of marketing operations conducted by these shops --- they accept orders for any type and design of furniture and/or joinery products in small quantities ;
- Quality levels of the products usually correspond to the minimum quality levels acceptable in the domestic market, i.e., they sell on price basis, which, of course, would hardly be acceptable in the international market for furniture and joinery products ;
- The use of insufficiently seasoned sawn-timber leads to faulty joints, poor surfacing of components and a generally low-grade workmanship. This condition, compounded by the poor state of the machines (lack of proper maintenance), inadequate maintenance of cutting tools (knives, bits, etc.), poor machine set-up, use of faulty and inaccurate jigs and the absence of dust and chips exhaustion system, further leads to the inability of the small shops, even though equipped with basic pieces of woodworking machinery, to produce interchangeable components of furniture and joinery products ;

- Poor "house-keeping" practices, inappropriate machinery lay-out and antiquated production techniques result to low productivity levels and poor workmanship ;
- The small and medium size factory owners usually could not themselves avail of existing incentives under their respective countries' development programmes for, on the average, they do not possess the financial, technical and managerial resources and capabilities to do so ;
- The typical organizational set-up shows that the supervision and direction of marketing, manufacturing and administrative functions are concentrated in one person (the owner) or a handful of close relatives. There is hardly any indication of the existence of middle-management in their set-up. Thus, inefficiency and inadequate supervision become great problems when the firm attempts to expand its operations ;
- Even medium-range marketing and manufacturing programmes are, as a rule, non-existent. Thus, the widely-accepted practices of quality, production and inventory controls are normally non-existent or are practiced at very primitive levels, resulting to undue wastages of raw materials in production operations and high cost of the products. The primary reason for this situation may be traced to lack of adequately trained personnel and the firm's inability to provide the necessary financial support for the upkeep of such production systems. The situation is further aggravated by such other factors as : a) the lack of specialization in the range of products manufactured and b) the lack of a marketing channel involving a desirable number of retail outlets;
- The great majority of furniture and joinery shops are usually clustered around urban centers of population.

This situation is brought about by the lack of adequate transport facilities (for products, materials and labour), and, in most cases, because they do not have retail outlets in places further away --- for they are not organized to sell on a national scale;

--- In the vast majority of cases, deliveries of finished products are based on completely assembled products or sub-assemblies which are assembled at customers' site. Thus, formal product packaging is almost totally absent. The packaging problem is further complicated by product designs and manufacturing techniques that do not allow volume shipment of products over long distance. This condition also contributes to the limitation of market coverage for the furniture and joinery products ;

--- These shops are not in a position to make use of the latest results of research and development activities for the industry, because management is not properly oriented to such innovations and progress in manufacturing techniques ;

--- Except in very few cases, the services of a professional furniture "designer" is not used, for the profession is virtually absent in developing countries. If ever "designers" are available, these are people trained in arts and crafts schools along artisanal methods. Thus, the predominant characteristics of furniture design in developing countries do not make use, but rather prevent, the application of more modern furniture manufacturing techniques which are made possible by more intensive use of machines (such as dowels, edge banding of panels, folded panels, etc.). Oftentimes, the designs are poor copies or adaptations of furniture designs from developed countries of Europe and America, so that although aesthetically pleasing, they are ergonomically

incorrect and usually very costly to produce. It is only in the manufacture of rattan furniture where the design can be considered to have been originated in the developing country, for the design of the furniture is fitted to the available production techniques. Thus, interchangeability of rattan furniture components, the pre-requisite for lower production and transport costs of the product thru the manufacture and shipment of "knocked-down" rattan furniture products is not fully availed of, because current production techniques in developing countries do not make use of machines and jigs which bend and shape a number of poles at one time, and drying facilities to preserve the shape of the bent poles, before cutting to final sizes and further machining of the component parts ;

--- A good majority of the small and some medium-size furniture shops in developing countries do not have contacts with the outside. Together with the inborn "secretiveness" of the entrepreneurs who own and operate those shops, this "isolation" prevents them from availing the use of recent developments in machines, tools, surface finishes, upholstery materials hardware, etc. Or, even if they become aware of such developments, these materials could not be availed of because of such factors as : a) smallness of their market, b) complicated import procedures, and c) lack of foreign exchange, thus putting the industry at a disadvantage. In some cases, the efforts of developing countries to protect the local industry's poor quality products through a total ban on the import of these materials, or the imposition of high tariffs on the import of these materials (making them uneconomic to use), compound the problems of further development of the industry ; and

--- There is a lack of technical consultants (or extension offices) to serve the industry.

2.2 Wood in Non-Structural Use for Housing and Construction

The development of the joinery industry, in particular, is hampered by the lack of standards which can stimulate larger scale production and also upgrade the smaller manufacturers with respect to the size of their series and the quality of their products. (It would also reduce costs and thus make wood more competitive with respect to other building materials).

There is still minimal use of commercially-less-accepted species (CLAS) whose physical and machining properties are already known to be acceptable for use in non-structural items needed in the housing and construction industry. It appears that efforts exerted so far to encourage the use of these species have not yet gained any appreciable success, even in low cost housing programmes where the demand for specific timber species are decidedly less restrictive than those for furniture and other building construction requirements.

2.3 Trade and Industry Associations

Regional and sub-regional trade and industry associations for the wood and wood products industry in Asia (e.g. SEALPA for sawn-timber, APPF for plywood and other wood-based panels, the AFFMA and AFFIA for furniture and joinery) have been reported to be actively engaged in safeguarding the interest and promoting the development of the industry, more particularly in Continental and Insular Southeast Asia together with Japan, South Korea and the Chinese province of Taiwan. Current activities of these associations are predominantly concerned with the marketing aspects of the industry. More concrete moves relative to technical co-operation among the members of the associations still have to be developed at regional or sub-regional levels.

Except in a few cases, the activities of trade and industry associations at national levels are more socially rather than professionally oriented.

Except in Asia, there are no regional associations for the national furniture manufacturers associations. More efforts should be directed to this end.

3.0 THE INDUSTRY'S MAJOR ISSUES

The foregoing typical picture of the furniture and joinery industry today in developing countries indicate that any significant stride in the development of the industry may be attained only after the resolution of the following issues :

3.1 The NEED for technical assistance to the industry in developing countries in order to attain a level of industrial technology appropriate to the conditions within the developing country and adequate to meet the objectives of the country's programmes for the development of the furniture and joinery industry, through :

- i - The introduction of and/or further development of basic concepts of product standardization, design and industrial engineering ;
- ii - The proper selection and judicious acquisition of production and supporting machinery and equipment, their lay-out and installation using normally accepted engineering practices ;
- iii - The introduction of and/or further development of manufacturing techniques which lead to better stabilization of wood in service, higher level of precision in machining operations and better protection of the finished products while being transported to the market, all of which contribute to better use and longer service life of the wooden product ;
- iv - The introduction of workable systems of quality,

production and inventory controls, and their gradual development to suit the available local resources and conditions ;

v - Facilitating the import of the necessary inputs and establishing drawback systems that function smoothly to put the industry in a position to compete in the international markets ; and

vi - The development of smaller and lower cost timber drying facilities, preferably using woodwastes as fuel, thus placing these within the purchasing capabilities of small and medium size woodworking shops (individually or within some form of cooperative venture with other firms), in order to place these firms in a desirable position to sell their wood products to customers (foreign or within the same country) located in areas with different climatic conditions.

3.2 The NEED for assistance in the training of the developing country's manpower resources to meet the changing demands of the growing furniture and joinery industry, in conjunction with the projected growth of the other sectors of the country's economy, through :

- i - Establishing new, or upgrading the existing training facilities within the country or region ;
- ii - Adopting measures to encourage technical cooperation among developing countries through the exchange of trainees from the furniture and joinery industry ;
- iii - Providing specialists from developed countries to train Trainers from among those qualified to be trained as such in the developing countries ;
- iv - Establishing training facilities for middle and upper management of the industry in developing countries ;

- v - The training of machine operators capable of maintaining and setting-up machines ; and the design and fabrication of jigs, fixtures and quality control gauges, as against the current practice of training carpenters, joiners and cabinet makers with but limited experience in the operation of a very limited range of basic woodworking machines ;
- vi - The training of sawdoctors, mechanical, electrical, pneumatic, hydraulic and electronic technicians to maintain the new generation of tools and machines ;
- vii - The publication of basic training material at the appropriate level and in the native tongue to teach the operators ; and
- viii - The publication of technical newsletters to inform the industry of new developments.

This training should preferably be aimed at operators and middle managers from existing plants and not at school learners and should be provided through short, intensive and specialized courses.

3.3 The NEED to maximize availment and application by the furniture and joinery industry of the results of research and development activities in the country and from other developing and developed countries, through :

- i - Establishing regular fora and such other media through which the industry and the research and development institutions can exchange information on industry's needs, current activities and accomplishments of the research institutions, thus helping make research and development activities more attuned and responsive to the needs of the industry ;
- ii - Encouraging more numerous and more frequent interchange of information on research and development

activities and their results among the existing institutions in the countries involved in international or regional development of the furniture and joinery industry ;

- iii - Encouraging the development of substitutes for imported materials through the use of indigenous materials and resources, including such secondary materials and supplies as paints, finishing materials, glues and other adhesives, screws, nails and other hardware items, upholstery materials, etc. ;
- iv - Maximizing utilization of existing research and development facilities through cooperative efforts at regional levels, thus fostering coordination and complementation of research and development activities among developing countries and avoiding unnecessary expenditures of a developing country's resources in duplicating research and development activities which have been previously completed or are being currently undertaken by another developing country ; and
- v - The use of research and development to modify traditional craft operations for machine production (with hand finishing), thus helping increase productivity significantly, lower production costs and consequently reducing the need for highly skilled craftsmen (who require many years to train).

3.4 The NEED to encourage and intensify technical and financial assistance to the efforts of some developing countries to reduce foreign currency outlays for the industry, thus helping increase the chances of survival of wood processing plant projects, and assuring more rapid development of the industry, through :

- i - The use of appropriate locally fabricated machinery and equipment designed to meet the requirements of

local conditions in the developing country ;

- ii - The use of locally fabricated production and ancillary materials and supplies such as paint and other coating materials and supplies ; adhesives, abrasives, nails, screws and other hardware items, upholstery materials and packing/crating supplies ; and
- iii - The preparation of market surveys, the development, dissemination and installation of standards appropriate to wood products supplied by developing countries, the creation of inspection schemes leading eventually to a quality label, and such other activities which will make these products acceptable and competitive in the foreign market.

3.5 The NEED, in the larger and more advanced countries, to establish specialized research and development centers to cater to the needs of the industry (such centers exist in most of the developed countries).

4.0 SPECIFIC TECHNOLOGIES CURRENTLY AVAILABLE FOR THE DEVELOPMENT OF THE INDUSTRY IN DEVELOPING COUNTRIES

The needs for the development of the furniture and joinery industry as presented in the preceding paragraphs come in varying degrees corresponding to the state of development of the economy, in general, and the level of industrialization, in particular, of each developing country. It is therefore almost impossible to formulate an industry development program which could effectively be applied to all developing countries.

However, there exist specific technologies which are capable of being applied individually and immediately, apart from an over-all development programme. These systems help keep capital investment at lower levels. Among others, the following specific technologies are recommended :

4.1 Low Cost Automation (LCA)

Basic woodworking machines can be fitted with pneumatic, hydraulic, electric and/or electronic devices, converting the basic machine into a semi- or fully-automated production machinery, and simultaneously facilitating high quality and quantity outputs at low capital investment costs. This technique is currently known as Low Cost Automation (LCA). The performance of the LCA-fitted machine approaches that of the corresponding brand new machine which would have cost several times more than what the LCA fitting cost. This technology will be most effective in countries where basic knowledge of pneumatics, hydraulics, electrics and/or electronics are available and in use.

4.2 "Knocked-Down" Furniture Production System

This system has been found effective in reducing the transport costs of the finished products. It also has the corresponding effect of enlarging the market coverage for the product, particularly in situations where the transport infrastructure system is not adequately developed to allow economic shipment of assembled finished products.

The technique calls for the re-design of current lines of furniture or joinery product to allow its shipment in the form of component parts, or compact sub-assemblies, rather than the bulky completely assembled product (resulting high transport costs). Precision machining of component parts of the products (to insure complete interchangeability) is a requisite for the introduction of this system.

4.3 Product Standardization

Selected designs or models of fast-selling furniture and joinery products are adopted as standard products and are "mass produced" and sold from inventory. This system allows maximum utilization of the available manufacturing

facilities and is facilitated by the repeated use of the same set of production jigs and fixtures specifically designed for the production of the components of the standard products. Flexibility of this system allows either "batch type" or "continuous type" of production runs. This system also helps keep the unit product cost at lower levels by spreading the fixed costs over a bigger quantity of finished products.

4.4 Product Specialization

This system could very well be used as the basis for a cooperative effort among the furniture manufacturers in a developing country where investment capital is not readily available. The underlying concept of the system calls for the manufacture of a very limited number of wood products by one factory, each of which is geared to be complementary to a product being manufactured by another firm. This system can be applied on a regional scale, where developing countries (among themselves or in cooperation with developed countries) can evolve a programme allowing each participating country to manufacture partially completed products or product components which its resources could manufacture at significantly lower costs than the other participant countries.

At country levels, this system calls for the manufacture of a specific line of furniture product or its component parts, which are then channeled to other furniture or joinery manufacturing firms for the final operations which would complete the product or set of products. For example, a firm specializing in upholstered products does not have to install its own production facilities for framings, if these can be supplied by other shops specializing in the manufacture of wooden frames for upholstered furniture items.

A similar system can be developed among developing countries on a complementation basis.

One of the major handicaps to the successful initiation of this system in developing countries is the lack of up-to-date and accurate information about the industry. Steps should be taken, possibly thru the help of regional industry or trade associations engaged in the manufacture and/or distribution of furniture or joinery products, to overcome this handicap.

Furthermore, the current costing systems used by the small and medium size furniture or joinery firms are inadequate to help their managements decide whether it will be profitable for them to purchase components from other firms or produce the components themselves. The need for action in this direction is indicated by the fact that these firms are not even in a position to tell which of the various product types they are producing are real profit-making products. Thus, recognizing the fact that a great majority of the furniture and joinery shops are engaged in the manufacture of a wide variety of product lines, the need for a more responsive and accurate costing system becomes evident and urgent. Productivity could be increased by using modern industrial engineering methods, and better designed jigs and work stations.

4.5 Dowel Construction Type of Furniture and Joinery Products

This specific technology is based on the extensive use of wooden dowels (and proper type of adhesives) to replace the costlier mortise and tenon, metal fittings, woodscrews and nails in joining one component to another. This technique requires a high degree of precision in machining component parts of the furniture or joinery product. However, this technique should be of great help in keeping down unit product costs in developing countries which usually import fittings, nails and woodscrews from remote sources. Utilization of the principal raw material is also increased by the use of trimming and ripping off-cuts from appropriate species (which otherwise would be consigned to the wood-waste bins) to make wooden dowels.

5.0 AREAS FOR REGIONAL/INTERNATIONAL COOPERATIVE EFFORTS

Opportunities for cooperative efforts at regional or international levels were mentioned in the preceding paragraphs. Additional such opportunities are found in the following areas of endeavour which are allied to or support the furniture and joinery industry in developing countries.

5.1 Research and Development for the Furniture and Joinery Industry

Extensive basic research on forests and timbers have been and are still being conducted in developing countries. Regrettably, similar efforts in industry-oriented endeavours such as furniture design, product engineering, adhesives, surface coating, development of locally manufactured hardware, fittings and upholstery auxiliary equipment, etc., appear to have been neglected. It is indicated that development of the industry can best be accelerated to desirable levels through co-ordinated efforts among the developing countries concerned. In this manner, maximization of the use of funds for research and development activities can be better attained.

5.2 Manpower Training for the Furniture and Joinery Industry

One of the principal handicaps to the speedy development of the industry in developing countries is the lack of properly-trained manpower to operate and manage the projected wood processing plants under the country's industrial development programme. Yet, it is surprising to note that most of the existing training facilities for the industry are not being fully utilized, primarily because of lack of funds and qualified TRAINORS. Furthermore, existing training facilities do not offer courses aimed at up-grading existing skills which is quicker and cheaper than starting from scratch with school learners. The current imbalance between the demand and supply of trained manpower is so great, and

is still expected to increase under the current development programmes of timber surplus countries, so that immediate concerted action among the countries concerned is indicated.

5.3 Sea Transport for Furniture and Joinery Products

Another major barrier to the development of the furniture and joinery industry in the developing countries' efforts to attain a foothold in the international market is the high cost of sea transport for the industry's products. While the industry has developed and is currently engaged in cooperative measures to avail of the services of sea carrier systems which have been developed to transport round logs, wood-based panels and sawn-timber economically, from the sources to the market, this is not true for furniture and joinery products. A great bulk of the industry's products are still transported as "filler cargoes" in both conference and non-conference vessels, and as such are charged the higher freight rates applied to common trade goods, for the small shippers have not yet formulated, nor perhaps realized the value of, a system which will enable them to ship their small volume of outputs in "group shipments". It appears that further rationalization of their marketing activities will help them avail of the lower freight costs for volume shipments. The volume output of the industry is unlikely to ever be enough to warrant economic transport on specialized carriers, thus cooperative efforts among the countries concerned should be even more important in order to attain a solution to the problem.

5.4 New Markets for Secondary Wood Products from Developing Countries

The past decade has indicated the emergence of selected countries in Middle East as a new market for joinery and builders' woodworks products from developing countries. Yet, available statistics show that the developing countries'

share of the market (as of 1979) is less than 25% of the total for the seven selected countries (Saudi Arabia, Abu Dhabi, Oman, Kuwait, Iraq, Jordan and Egypt). The aggregate volume of imports of joinery and builders' wood-works was approximately US\$120,000,000 in 1979 and all indications point to further increase in these imports through the end of this century up to the first decade of the next century.

This situation, together with the current desire of timber surplus developing countries to accelerate the development of their wood and wood products industry, provide a fertile ground for North-South cooperation in the form of technology transfer, development of marketing and distribution systems, and such other areas which will benefit the interest of both developed and developing countries.

More opportunities for cooperative efforts at regional or international levels are expected to be brought up during meetings convened for this purpose.

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