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TYPOLOGICAL STUDY LEADING TO DEVELOPMENT STRATEGY FRAMEWORK FOR THE WOOD INDUSTRIES SECTOR

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International Forest Science Consultancy
a division of
Land and Timber Services Limited
Woodhall Mill House
10 Woodhall Millbrae
EDINBURGH EH14 5BJ   November 1989.

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WOOD INDUSTRY CLASSIFICATION SYSTEM

1. INTRODUCTION

This report has been produced in response to a request from UNIDO "To produce a framework for classifying developing countries with respect to their level and type of wood-based industries so that integrated technical assistance programmes can be developed that will be applicable to each group with relatively common factors".

The report considers the type of information which is available and relevant to such a classification system. Possible criteria for grouping countries are discussed, resulting in the development of a framework of basic characteristics, constraints variables and enhancement variables which could be used in a Wood Industry Classification System (WICS).

Using, as examples, eight countries from each of South and Central America, Africa, and Asia, the framework is tested to examine its usefulness for identifying groups of countries having similar needs to develop their wood based industries.

The use of quantifiable variables or classifications allows mathematical and statistical methods to be used to further refine the selection of variables for use in the classification system and to decide the optimal groupings of countries. These are considered in relation to the foregoing discussion and recommendations are made for further work in this field.

2. BASIC CONCEPTS FOR A CLASSIFICATION SYSTEM

There are about 120 developing countries which use some wood-based products. A few of these counties have no forest capable of supplying commercial timber, though some do have wood-based industries using imported raw material. There are countries which rely almost exclusively on imports of manufactured wood products, and there are others with wood processing capacity greatly in excess of domestic demand which export one or more manufactured products.

Wood-based industries are generally divided into primary processing which takes predominantly roundwood from the forest, and secondary processing which carries out further processing and assembly of products. While primary processing is more or less limited to sawing, reconstituting into various panel products and pulping for fibre, the secondary industries are many and diverse.

Primary sawmilling can be carried on at almost any scale, and with a very wide range of species and so accounts for the largest proportion of industrial roundwood usage in developing countries. Virtually every developing country has some sawmilling capacity. Table 1. below gives the proportion of industrial roundwood production classified as sawlogs for each region, averaging over 63%. This proportion is comparable with that in the world as a whole, but the total for developing countries is only 23% of world total.

TABLE 1.

Annual sawlog production (1000 m3) as a proportion of total industrial roundwood production (1000 m3) in developing countries by region, and in the world as a whole (1987).

REGION	IND.ROUNDWOOD PRODUCTION	SAWLOGS PRODUCTION	SAWLOGS % of IRW
AFRICA	41881	17635	42.1
CENTRAL & SOUTH AMERICA	104528	64332	61.5
ASIA & OCEANA	222839	152400	68.4
TOTAL	369248	234367	63.5
WORLD	1633089	1002620	61.4

Source: FAO Yearbook of Forest Products Statistics 1987.

Pulp manufacture is generally capital intensive and benefits from economies of scale, which tends to dictate relatively large plants. In addition, the wood fibre properties are important and this limits the number of species which can be utilised. Therefore pulping capacity in developing countries is restricted to a relatively small number of countries. Only 31 out of 120 developing countries have wood based pulp plants and their total capacity accounts for only 7.7% of the world total. See Table 2.

TABLE 2

The proportion of global annual manufacturing capacity in developing countries for all grades of wood-based pulp by Region 1988.

REGION	TOTAL PULP CAPACITY	PROPORTION OF WORLD TOTAL
AFRICA	906	0.6
CENTRAL & SOUTH AMERICA	7011	4.4
ASIA	3961	2.5
WORLD	160174	100.0

Source: FAO Pulp and Paper Capacities Survey 1988-1993.

The manufacture of wood-based panel products is intermediate between these two extremes both in terms of operating scale and species selectively, and is therefore found in a greater number of developing countries than is pulping. Currently around 62 or just over half the developing countries have wood-based panel plants, but total capacity is only about 14% of the world total.
See Table 3.

TABLE 3

The proportion of global annual manufacturing capacity in developing countries for all types of wood-based panels by region 1980.

REGION	TOTAL W.B.P. CAPACITY	PROPORTION OF WORLD TOTAL
AFRICA	812	0.7
CENTRAL & SOUTH AMERICA	5305	4.4
ASIA	10456	8.7
WORLD	120296	100.0

Source: FAO World Production Capacities Plywood, Particleboard and Fibreboard.

The secondary processing of wood follows on from the primary processing. Sawnwood is the basis of a wide range of manufacturing activities which essentially retain the natural characteristics of the wood and take advantage of its mechanical properties or its aesthetic qualities or both. Some of these products, especially those making use of the aesthetic properties of appearance, smell and texture result in very high added value. Generally these products are relatively low volume. At the opposite end of the spectrum wood used in construction and packaging is much more dependent on mechanical properties than appearance, and volumes tend to be high while value added is relatively low.

Wood-based panels are only used in a few applications without further processing. As with sawnwood aesthetic properties are important for some uses, and are generally obtained by surface veneering. This means that relatively small amounts of decorative timbers are required and these can be imported if not available from local resources.

Pulpwood is used as the basis for paper making. Paper making can be a relatively small-scale operation, and often blends of more than one type of pulp are used. There is therefore no overriding need for pulp and paper mills to be integrated. This allows the possibility of a developing country producing pulp solely for export with no local paper making capacity, such as Swaziland, or having paper making capacity dependent on imported pulp. Sufficient pulp is traded internationally to make this feasible.

In principle therefore, the development of a wood industry need not be constrained by lack of an indigenous source of raw material or by lack of a domestic market for end products. However the international market in wood-based products is highly competitive so that success depends very much on having some competitive advantage. Since wood and wood products are relatively bulky in relation to their value, transport and shipping can in many cases become a big factor in determining the competitiveness of a company operating in the international market. Thus countries like Swaziland with good access to the sea have developed an export pulp industry, while Malawi, with an equally good but remote resource and a larger domestic market have so far not succeeded.

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While the data in Tables 1 to 3 indicate that wood processing in developing countries is small and generally underdeveloped this does not seem to be directly correlated with any main social and economic criteria used to classify development such as GDP/caput or adult literacy rate.

It is necessary to examine the current state of the wood industry in the individual countries to obtain a better guide to criteria which might be used for classification.

3.   CRITERIA FOR CLASSIFYING THE WOOD INDUSTRIES OF INDIVIDUAL COUNTRIES

A major problem in examination of the wood industry in developing countries is the general lack of complete and consistent data over the sector as a whole. Data does exist for primary wood processing for most countries, but the secondary industry covers such a multitude of different types of processing ranging from furniture and joinery through such products as packaging, souvenirs, toys, toothpicks, matches, musical instruments, to highly specialised products used in marine and ordinary construction. Paper manufacture from wood-based pulp may also be considered as a secondary wood industry. Some of these add little value to large volumes of wood and others add much value to a little wood.

In considering criteria which could be used to distinguish wood industries with similar characteristics in different countries, it is necessary to use subjective judgement in the first instance, based upon experience of the industry in general.

Figure 1. gives a schematic representation of the wood industry, showing the linkages that exist, and the direction of flow of the factors which are transferred. This may be wood products, other materials or cash. The figure could be greatly elaborated to distinguish different types of flow but at this stage this is not considered helpful.

The figure indicates that the sector as a whole can be divided into a number of main components, ranging from the resource to final consumption. A total of 24 basic characteristics of these components have been defined. (see list (a)).

The constraining variables on each of the components, which limit the realisation of that component's full potential, are given in list (b).

In list (c) the enhancement variables for each component are given. These may represent an advantage that can be used to promote wood industry development.

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Figure 1.   Diagramatic representation of the Wood Industry, showing linkages between the Basic Characteristics used in the Classification System.
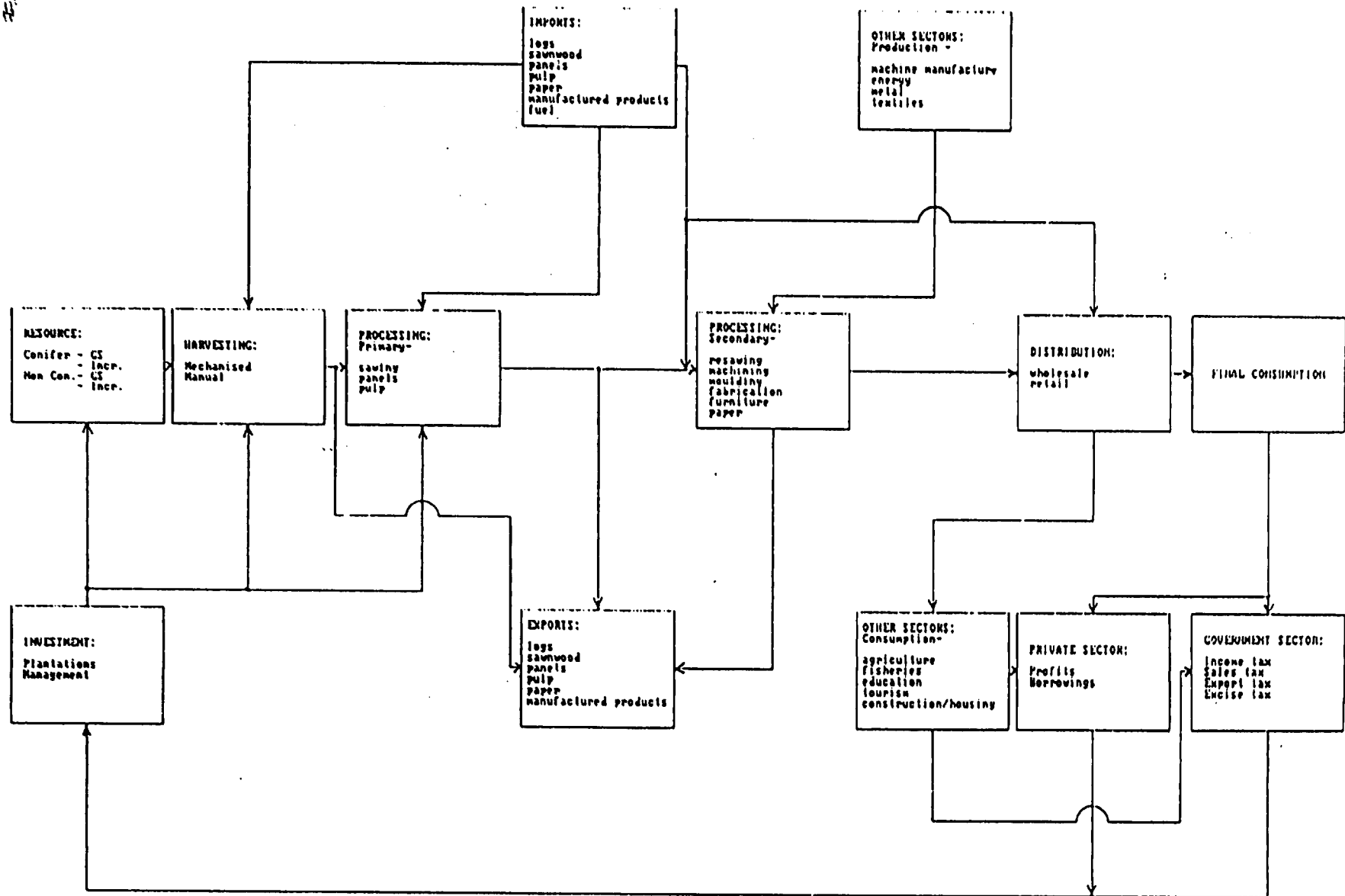
a) List of Basic Characteristics

Component		Characteristic	Description
RESOURCE	1	Sustainable cut.	The level of production from the country's forests which could be sustained indefinitely.
HARVESTING	2	Industrial Roundwood Production.	The volume of logs produced from the country's forests which are suitable and available for use by wood processing industries (Non-industrial roundwood production is mostly for fuel).
	3	Supply Balance	The surplus or deficit of domestic production over domestic consumption of wood.
PROCESSING a) PRIMARY	4	Industrial Roundwood Consumption.	The volume of industrial roundwood used by the country's wood processing industries.
	5	Sawlog Consumption.	The volume of sawlogs used by the country's sawmilling industry. This is one of the components of industrial roundwood consumption.
	6	Sawmilling Capacity.	The volume of sawnwood which can be produced by the country's sawmills given adequate supplies of sawlogs.
	7	Wood-based Panel Capacity.	The volume of wood based panels which can be produced by the country's mills given adequate supplies of raw materials, e.g. chipboard, fibreboard, medium density fibreboard.
	8	Pulp Manufacture Capacity.	The volume of wood pulp which can be produced in the country given adequate supplies of raw materials.

b) SECONDARY	9	Wood Machinery Capacity.	The capacity of industry to produce machined wood products e.g. joinery.
	10	Fabrication Capacity.	The capacity of industry to manufacture goods from several components e.g. furniture.
	11	Paper Manufacture Capacity.	The amount of paper which could be produced in the country given adequate supplies of pulp from domestic production or imports.

Note: at 100% utilisation production = processing capacity.

DISTRIBUTION & MARKETING	12	Distribution Chain.	The series of stages which a product passes through between manufacturer and end user.
CONSUMPTION	13	Income Level.	The GDP/caput.
	14	Per Capita Consumption.	Average total consumption of wood and wood products (excluding fuel wood) per member of the population.

OTHER SECTORS

a) CONSUMPTION	15	Industrial Consumption.	The volume of wood and wood products used by industry e.g. construction, packaging or for further processing.
b) PRODUCTION	16	Processing Inputs.	The availability of capital goods, spare parts and materials required for processing.
	17	Energy Cost.	The average cost of energy (This reflects the availability of indigenous supplies and the need to import energy supplies).
TRADE a) IMPORTS	18	Raw Material Imports.	The quantity of industrial roundwood imported.
	19	Primary Wood Product Imports.	The quantity of primary wood products imported (These include sawnwood, panels and wood pulp).

b) EXPORTS   20 Primary Wood Product
                       Exports   The quantity of primary wood
                                               products exported.   ~~

                   21 Finished Wood Product
                       Exports   The quantity of wood products
                                               exported to be used in their
                                               present form without further
                                               processing.
INVESTMENT   22 Private or Public
                       Ownership.   The proportion of forest and
                                               wood processing industries in
                                               private, community or state
                                               ownership.

The characteristics listed above are each affected by the following
        national characteristics.

GOVERNMENT
POLICY   23 Financial and
                       Fiscal Incentives.   The incentives offered by
                                               government to attract or direct
                                               investment in the wood industry.
                                               These may include grants,
                                               subsidies and tax concessions.

                   24 Sector Priority.   The priorities given to
                                               providing for domestic
                                               consumption, increasing exports
                                               or import substitution within
                                               the sector.

b) List of Constraint Variables

WICS COMPONENT	CONSTRAINT VARIABLE NO	DESCRIPTION
RESOURCE	1	Total resource of commercial species is inadequate to meet projected growth in demand.
	2	Availability of foreign exchange to increase imports is limited.
	3	Inadequate resource management limits supply sustainability.
	4	Land pressure reducing supply or limits scope for industrial plantations.
	5	Raw material supply limited by low extraction capacity of small-scale or under-equipped operators.
	6	Heavy extraction losses.
PROCESSING	7	Primary industry restricted by over emphasis on log exports.
	8	Primary industry undercapitalised and/or under-equipped resulting in poor quality and heavy losses.
	9	Lack of timber grading and drying facilities.
	10	Secondary industry limited by lack of quality sawnwood and wood based panel products.
	11	Secondary industry limited by lack of product designs and export.
DISTRIBUTION AND MARKETING	12	Distribution infrastructure inadequate so that industries are constrained by size of local market.
	13	Distribution chain excessively long, so that prices are high to end-user and producer profits are squeezed.

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CONSUMPTION	14	Low income constrains domestic consumption of products.
	15	Cultural factors limit use of wood products.
	16	Product quality limits domestic consumption and/or exports.
OTHER SECTORS	17	Limitations to manufacture of wood products due to lack of other materials e.g. glues, hardware, textiles.
	18	Limitations to manufacture due to shortage of capital goods and spare parts.
	19	Limitations to manufacture due to lack of repair and maintenance facilities.
	20	Lack of skilled manpower to develop wood processing.
	21	Lack of locally available power or fuel to develop wood processing.
	22	Infrastructure for processing and storage is limited or congested.
GOVERNMENT POLICY	23	Over emphasis on log exports for short-term revenue benefits.
	24	Restrictions on imports of capital goods and spare parts.
OTHERS	25	Lack of integration along the wood chain (vertical) leading to excess waste and inefficiencies.
	27	The country is subject to war and civil unrest.

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c) List of Enhancement Variables

COMPONENT	ENHANCEMENT VARIABLE NO	DESCRIPTION
RESOURCE	1	The sustainable cut exceeds current raw material requirements.
	2	A substantial industrial plantation programme is in hand.
	3	Tree species which are valuable or have unique/special properties being underutilised.
	4	Good potential for plantations.
HARVESTING	5	Harvesting facilities well equipped and well managed.
	6	Transport infrastructure well developed.
PROCESSING	7	Well developed industrial infrastructure with serviced sites available.
	8	Well established primary wood processing industry either export oriented or underutilised producing graded and seasoned sawn lumber.
	9	Established wood based panel manufacturing plants in the country
CONSUMPTION	10	Substantial proportion of domestic market supplied by imports.
	11	Living standards rising rapidly.
OTHER SECTORS	12	Good local availability of capital goods, spare parts, services and infrastructure.
	13	Energy readily available.
INVESTMENT	14	Foreign investment and/or joint ventures in other manufacturing sectors have resulted in successful enterprises and technology transfer.

GOVERNMENT POLICY	15	High priority attached to Wood Industry development for domestic consumption or export.
	16	Positive attitude to foreign investment and/or joint ventures.
	17	Incentives available to encourage and assist new wood industries.
	18	Good training facilities available to ensure adequate skills at all levels from management to shop floor.

The area of closed forest in a country will give a broad indication of the quantity of industrial timber which that country could produce on a sustainable basis. At a more detailed level it is necessary to know about the composition of the resource and its management.

The forest area/ caput (closed forest area divided by the population) gives an indication as to whether there is likely to be pressure on the forest or not. A small area of forest / caput will generally mean that the forest will be insufficient to meet local needs, for raw material and the country will either have to import raw material or products, or have consumption constrained. The lack of raw materials alone however does not preclude a wood-based industry, as exemplified by Singapore and Republic of Korea, and of course Japan.

The recorded annual production of industrial roundwood, should be influenced on the one hand by the potential output from the forest and on the other hand by the existing industries' capacity to process wood.

Dividing the recorded annual industrial roundwood production by the area of closed forest, also gives a measure of the pressure on the resource. A low figure may suggest either poor quality or underutilised forests or both, while a high figure, more than about 1 m3/ha/an for tropical forests, may suggest over cutting or a reliance on plantation supplies.

The annual consumption of industrial roundwood may differ considerably from production if the country is a net importer or exporter of logs or wood products.

The difference between the actual annual removals (production) per unit area and the annual consumption of industrial roundwood per unit area derived from the country's own forests, gives a measure of the country's surplus or deficit of industrial roundwood.

$$\text{Surplus/Deficit} = \frac{\text{IRW Production} - \text{Total Consumption (IRWe)}}{\text{Area of Commercial Forest}}$$

(IRWe = Industrial Roundwood equivalent - converting the quantity of finished products to the roundwood needed to produce it).

For the countries which have a deficit it must be made up by imports.

By measuring the surplus/deficit per unit area of forest, the comparison between countries becomes more meaningful, as the measure is relative rather than absolute, and gives an indication of importance of the situation.

This can be illustrated by comparing four countries in Latin America.

TABLE 4

Comparison of Industrial Roundwood Production Consumption and Surplus
in absolute terms and per unit area of forest.

	Prod IRW 1000 m3 (m3/ha)	Total Cons IRW 1000 m3 (m3/ha)	Exp IRW 1000 m3 (m3/ha)	Domestic Cons IRW 1000 m3 (m3/ha)	Surplus Deficit 1000 m3 (m3/ha)
Argentina	5414(0.71)	5423(0.71)	204(0.03)	5219(0.68)	195(0.03)
El Salvador	81(0.53)	81(0.53)	4(0.03)	77(0.50)	4(0.03)
Uruguay	257(0.45)	257(0.45)	16(0.03)	241(0.42)	16(0.03)
Paraguay	3240(0.79)	3240(0.79)	568(0.14)	2672(0.65)	568(0.14)

In absolute terms the four countries are very different. Relative to
its forest resources Paraguay is exporting a much greater amount
than the other three, though its total production is substantially
less than Argentina. In Uruguay the total production per unit area
is much lower than Argentina and Paraguay which suggests the
possibility of some underutilised capacity.

Annex 1, Table 1, gives details of forest areas, industrial roundwood
production, consumption and exports for 117 developing countries in
South and Central America, Africa and Asia and Table 2 ranks the
countries by region according to their net surplus / deficit of
production per unit area.

This ranking shows that the majority of developing countries are
nearly in balance, but there are a significant number which have a
substantial surplus, and another group with a substantial deficit.

Thus as an initial classification of countries 3 classes can be
recognised:

43 - countries with a production surplus over domestic consumption.
44 - countries with consumption in balance with production.
30 - countries with a deficit of domestic production.

In order to examine in more detail the feasibility of obtaining and
tabulating data for developing countries that can be used in cluster
or other such analysis, eight countries have been selected from each
region.

These have been selected at intervals down the lists in Annex I
Table 2, so that the countries have respectively large, medium and
small surpluses, a balance between production and consumption and
small, medium and large deficits. In making the selection, countries
have been chosen where data is available from such studies as the
UNIDO Industrial Development Review Series.

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The selected countries are given in Table 5, below.

TABLE 5

Developing Countries by Region selected for examination of wood industry data.

CENTRAL & SOUTH AMERICA	ASIA & OCEANA	AFRICA
Chile	Malaysia	Swaziland
Costa Rica	Indonesia	Zimbabwe
Brazil	Nepal	Kenya
Nicaragua	Burma	Zaire
Mexico	Thailand	Malawi
Peru	Iran	Sierra Leone
Cuba	China	Ethiopia
Dominican Rep	Korea Rep	Egypt

The data available from major FAO and UNIDO sources for these countries relating to the wood industries is given in Annex 2 Tables 1 and 2.

An examination of the data for the 8 selected countries suggests a number of correlations between the data sets, which seem worthy of more detailed study.

a)   Surplus countries appear to be less efficient in converting roundwood to finished product. as measured by the volume of roundwood produced per unit of end product.   The very low values found for Cuba, Dominican Republic, Republic of Korea and Egypt, (Col 13 Table 1 Annex 2) suggest that there may be considerable errors in the recorded data.

b)   Deficit countries tend not to be exporters of wood products but there are exceptions such as China and Republic of Korea, which suggest that shortages of domestic raw material need not necessarily be a constraint on developing processing capacity.

c)   Apparent consumption/ caput declines from surplus to deficit countries, which suggests that consumption is price sensitive. Products are likely to be cheaper when manufactured locally from an abundant resource, than when imported from elsewhere. This seems to apply to sawnwood to a much greater degree than to other primary product categories.

Annex 3, examines the relationship between those variables for which complete sets of data could be obtained.   GDP, GDP/caput, Total Wood product Manufacturing Capacity, TWPM Capacity/Caput, the net Surplus/Deficit and the overall national Percent of GDP contributed by industry.   The latter is an index of how industrialised the country is.

The tables in Annex 3 do not reveal any particular variable which could be used as a reliable indicator of the general prosperity

and/or state of the wood industries in a country. Some relationships appear to exist such as a general increase in the total manufacturing capacity with increasing GDP (Annex 3 Table 2). Other relationships may be revealed between combinations of these and other variables by statistical analysis. This is discussed in the next section.

Once a set of variables have been identified such as those in Lists-a,b and c, as much data as possible should be collected for a sample of the countries to be classified. It is very difficult to consider a range of variables at the same time using subjective judgements. Statistical methods should be used to assist in forming a rationale for grouping countries with similar needs.

The first stage is to eliminate redundant variables from the analysis. In the example at the end of section 4 we noticed a possible relationship between total manufacturing capacity and GDP for a country. The strength of this relationship could be tested by calculating the correlation coefficient for these or any other two variables. If it is found that a very significant correlation exists (positive or negative) then only one of these variables need be considered further. The other can be predicted from the first with some (known) degree of confidence. This may allow us to drop some variables from the classification system which will simplify data collection. Tests of correlation may be carried out on quantifiable (parametric) variables using Pearson's correlation coefficient. Similar tests can be carried out on variables which are only categories (non-parametric data) so long as these can be ranked (e.g. a score of 1-10 assigned for ease of transport). Methods available in this case include Kendall's Tau and Spearman's rank correlation coefficient.

A further reduction in the number of variables used can be achieved by testing for relationships between one variable and a group of others. For example, we may wish to find the relationship between industrial roundwood consumption, sawmilling capacity, pulping capacity and panel manufacturing capacity. Two main methods can be employed as described below:

Regression Analysis can be used to derive an equation relating the dependent variable (industrial roundwood consumption) with the independent variables (sawmilling, pulping and panel manufacturing capacities). This will allow us to make predictions for the dependent variable given the other three, and a measure of the accuracy of the prediction. This could be used to estimate missing values of industrial roundwood consumption. The analysis also indicates the relative value of including each of the independent variables in the equation. A further use of regression equations could be in developing the strategies for technical assistance once the groups have been decided. It would be possible, for example, to predict the effect of increasing investment in sawmilling capacity on the level of exports and hence whether such investment is worthwhile.

Analysis of variance can also be used to determine which variables are significantly related to some chosen variable. This technique is particularly valuable as it can be used for sets of variables which are not orthogonal (i.e. they are not independent of one another) as an example a test could be carried out to determine how much of the variance in industrial roundwood consumption is due to the level of imports given that sawmilling, pulping and panel manufacturing

capacities have already been taken into account. The effect of interaction between factors could also be considered with analysis of variance. One particularly useful method for carrying out an analysis of variance is the "regression method" (this is not the same as regression analysis). This allows the analysis of incomplete data sets without the need to estimate missing values.

The techniques described above are useful for analysing the relationships between variables for which data is available. Another technique which may provide valuable information is Factor Analysis.

Factor Analysis is a method of deriving variables from a combination of others. Hence it may be possible to derive a variable called "state of the wood industry" from underlying trends revealed in data such as processing capacities, levels of exports, and the rate of growth or decline in investment in the industry. Variables such as this may be of direct interest or could be used in further analysis as described below.

So far we have considered objective methods for refining the choice of variables used to classify countries from the original subjectively chosen variables listed in Section 3. The final stage is to form groups of countries for which technical assistance programmes can then be developed. One method is to use factor analysis to derive a single or small number of variables on which countries can then be grouped by forming subjective divisions. Other methods are also available.

Dimensional analysis involves assigning a single score to each country and then grouping the countries having similar scores. The method requires subjective assessments of the importance of each variable. Hence each variable is effectively converted to a score reflecting its importance in deciding the state of the country. The method could be useful to identify sub-groupings in some circumstances but is too subjective and over-simplifying to be used for the main grouping of countries.

Cluster analysis is likely to be the key method used to define groups of "similar" countries. It can be used to consider a number of variables at once and determine the groupings which reduce the total within-group variance of all the variables to a minimum. The main problem with this would probably be converting all the variables to a similar scale. This would require some degree of subjective judgement.

Whilst very many developing countries could benefit from technical assistance programmes for their wood industries, the needs of individual countries differ. This may be due to their economic, political or geographic situations etc. An important factor is often their size and the resulting scales of operations in the country. In order to provide integrated technical assistance programmes, some system of grouping countries is necessary and this will inevitably require the development of a classification system for the wood industries of developing countries.

The first stage in the development of a classification system is to identify the main components of the industry (see Figure 1) A set of variables can then be defined to describe the basic characteristics, constraints and positive (enhancement) factors of these components for a given country. This stage is essentially subjective.

The next stage is to collect data on these variables for some countries. This can be used to eliminate unnecessary variables from the analysis. This involves the use of statistical techniques to identify variables which tell us no more about the industry than we could deduce from other variables in the analysis.

The final stage involves using further statistical techniques to identify groups of countries with similar needs.

It is important to remember that, although carrying out the statistical analyses is a very mechanical process, all require some element of subjective assessment, to be used to their best effect on the data available.

Using the groupings produced by the analyses, steps can be taken to formulate appropriate technical assistance programmes. As discussed in Section 5, methods such as regression analysis may be useful at this stage also.

It has not been possible to carry out a complete analysis of the data presented in the annexes within the time available. Some additional data would also be required to produce useful country groupings. Further work should begin with a more complete search for available data, particularly on secondary wood processing industries. Analysis of the data should then be carried out using the framework of variables given in Section 3 and the statistical methods discussed in Section 5. From this it should be possible to test the usefulness of these methods for developing technical assistance programmes and to identify which other items of information should be collected to assist in this effort.

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UNIDO

IFSC

ANNEXES

ANNEX 1   Table 1

1989 Industry Classification /other country data

CENTRAL AND LATIN AMERICA

Country	Cl. C.orest (1000 ha)	Cl.N.forest (1000 ha)	Tot. Cl. forest (1000 ha)	Population (1000)	For. area/cap (ha/cap)	Ind.R.wood Prod. (1000 m3 r)	Ind.R.wood Con. (1000 m3 r)	Cons/cap (m3/cap)	Cons. (m3/cap)	Prod. (m3/cap)	Net Sawlbol (m3/cap)	Exports (net) sawnwood	panels	pulp	paper	Total Exports (total) m3 r	Ind. Rw Net Con. consumption
Argentina	2320.00	5236.00	7636.00	27056.00	.28	5434.25	5219.00	.19	.68	.71	.03	.00	22.00	66.00	14.00	204.00	5425.00
Bolivia	3.00	44010.00	44013.00	6570.00	6.70	110.00	90.00	.02	.00	.00	.00	24.00	1.00	.00	.00	50.00	149.00
Brazil	13520.00	382510.00	396030.00	122325.00	3.24	61128.00	61125.00	.50	.15	.17	.00	455.00	471.00	883.00	672.00	1500.00	66103.00
Chile	1230.00	5020.00	6250.00	11107.00	.56	10173.00	5783.00	.52	.92	1.82	.71	957.00	52.00	565.00	145.00	2344.00	7057.00
Colombia	607.00	46744.00	47351.00	25794.00	1.84	2635.00	2619.00	.10	.08	.28	.00	1.00	3.00	.00	23.00	54.00	2672.00
Dominica	.00	29.00	29.00	83.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
Ecuador	107.00	14572.00	14679.00	8023.00	1.83	2443.00	2350.00	.29	.16	.17	.01	27.00	18.00	.00	50.00	50.00	2449.00
Fr Guiana	2.00	8903.00	8905.00	62.00	143.63	182.00	159.00	2.56	.02	.02	.01	12.00	.00	.00	.00	23.00	183.00
Guadaloupe	.00	.00	.00	329.00	.00	2.00	2.00	.01	.01	.00	.00	.00	.00	.00	.00	.00	2.00
Guyana	12.00	18073.00	18073.00	884.00	20.91	162.00	162.00	.18	.09	.01	-.01	9.00	.00	.00	.10	18.00	162.00
Martinique	.00	.00	.00	327.00	.00	1.00	1.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	1.00
Paraguay	18.00	4082.00	4100.00	3165.00	1.30	3200.00	2872.00	.84	.65	.77	.14	251.00	31.00	.00	.00	568.00	3240.00
Peru	370.00	70150.00	70520.00	17625.00	4.00	1210.00	1198.00	.07	.07	.02	.00	2.00	1.00	.00	8.00	22.00	1210.00
Surinam	65.00	14830.00	14913.00	389.00	38.34	182.00	163.00	.42	.01	.01	.00	3.00	4.00	.00	.00	14.00	176.00
Trinidad Tobago	68.00	300.00	368.00	1153.00	.32	35.00	37.00	.03	.01	.10	-.01	.00	.00	.00	.00	.00	37.00
Uruguay	28.00	560.00	590.00	2995.00	.19	257.00	241.00	.08	.42	.10	-.03	.00	.00	.00	.00	16.00	257.00
Venezuela	1129.00	31953.00	33075.00	15620.00	2.12	490.00	597.00	.04	.02	.01	.03	.00	.00	.00	.00	.00	597.00
Belize	116.00	1289.00	1385.00	162.00	8.55	29.00	25.00	.15	.02	.02	.00	1.00	.00	.00	.00	2.00	27.00
Costa Rica	11.00	1653.00	1664.00	2213.00	.75	396.00	396.00	.18	.21	.21	.04	6.00	21.00	.00	9.00	70.00	510.00
Cuba	970.00	2053.00	3023.00	9732.00	.31	535.00	555.00	.06	.18	.17	-.01	.00	.00	.00	.00	.00	555.00
Dominican Rep.	261.00	441.00	983.00	5946.00	.12	6.00	37.00	.31	.05	.01	-.05	.00	.00	.00	.00	.00	37.00
El Salvador	44.00	111.00	155.00	4801.00	.03	71.00	72.00	.02	.50	.52	.03	.00	.00	.00	2.00	4.00	91.00
Guatemala	750.00	3846.00	4596.00	7262.00	.63	114.00	114.00	.01	.01	.22	.02	79.00	.00	.00	5.00	68.00	112.00
Haiti	12.00	46.00	58.00	5809.00	.01	233.00	239.00	.04	4.12	4.12	.02	.00	.00	.00	.00	.00	227.00
Honduras	1942.00	1855.00	3797.00	3633.00	1.05	408.00	428.00	.12	.11	.21	.10	107.00	.00	.00	.00	316.00	806.00
Jamaica	83.00	112.00	195.00	2192.00	.01	80.00	73.00	.01	.46	.41	.01	.00	.00	.00	1.00	2.00	60.00
Mexico	20490.00	27350.00	47840.00	67752.00	.71	7063.00	7063.00	.10	.13	.15	.01	25.00	15.00	.00	119.00	119.00	7062.00
Nicaragua	338.00	4170.00	4508.00	2737.00	1.65	580.00	580.00	.31	.19	.20	.01	9.00	3.00	.00	21.00	21.00	930.00
Panama	35.00	4169.00	4204.00	1927.00	2.18	338.00	338.00	.18	.00	.03	.00	1.00	1.00	.00	2.00	2.00	340.00
Puerto Rico	6.00	150.00	156.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	44512.00	690720.00	735240.00	397283.00	2.07	103453.09	102523.00	.21	.14	.14	.00	2031.00	.00	.00	.00	.00	102523.00

ASIA

Country																	
Afghanistan	200.00	.00	200.00	15906.00	.01	1571.00	1571.00	.10	7.86	7.36	.00	.00	.00	.00	.00	.00	1571.00
Bahrain	.00	.00	.00	313.00	.00	72.00	72.00	.23	.00	.00	.00	.00	.00	.00	.00	.00	72.00
Bangladesh	.00	2207.00	2207.00	88164.00	.03	817.00	811.00	.01	.37	.38	-.02	.00	.00	18.00	.00	36.00	837.00
Bhutan	628.00	1544.00	2170.00	1360.00	1.67	278.00	271.00	.21	.12	.13	.00	.00	.00	.00	.00	.00	271.00
Burma	116.00	31985.00	32101.00	35389.00	.91	2960.00	2671.00	.08	.08	.37	.01	61.00	.00	.00	.00	122.00	2793.00
China	4000.00	85000.00	123000.00	994013.00	.13	94254.00	104369.00	.10	.33	.75	-.08	65.00	520.00	77.00	198.00	2152.00	104521.00
India	4937.00	67586.00	72521.00	684460.00	.11	23958.00	23958.00	.03	.12	.33	.00	2.00	16.00	.00	1.00	38.00	23798.00
Iran	20.00	1880.00	1900.00	38126.00	.05	4278.53	4431.00	.12	2.36	2.50	-.06	.00	.00	.00	.00	.00	4431.00
Iraq	28.00	10.00	30.00	13086.00	.00	50.00	50.00	.00	1.67	1.67	.00	.00	.00	.00	.50	.00	50.00
Jordan	18.00	36.00	54.00	3344.00	.02	4.00	4.00	.08	-.07	.27	.15	.00	1.00	.00	10.00	20.00	16.00
Kampuchea De	21.00	7595.00	7516.00	6741.00	1.13	567.00	567.00	.01	.07	.07	.00	.00	.00	.00	.00	2.00	267.00
Korea DPR	6300.00	2170.00	8370.00	17813.00	.50	693.00	671.00	.22	.07	.57	-.01	.00	1.00	.00	.00	.00	671.00
Korea Rep	1440.00	1825.00	6325.00	38855.00	.16	228.95	8539.00	.22	1.33	.23	-.73	176.00	204.00	.00	251.00	1293.00	1634.00
Kuwait	.00	15.00	13.00	1353.00	.01	.00	120.00	.09	.07	.06	-.00	37.00	7.00	.00	11.00	124.00	.00
Laos	250.00	8270.00	8520.00	5721.00	2.29	280.00	280.00	.03	.03	.05	.00	2.00	.00	.00	.00	1.00	280.00
Lebanon	10.00	25.00	23.00	2358.00	.01	4.00	4.00	.01	.11	.21	.40	11.00	.00	.00	.00	2.00	20.00
Malaysia	109.00	21187.00	21235.00	14006.00	1.51	3433.00	3433.00	.21	.13	.42	.17	822.00	.00	.00	1.00	1325.00	11256.00

Cont.	Cl. C.forest (1000 ha)	Cl.M.forest (1000 ha)	Tot. Cl. forest (1000 ha)	Cl. forest (1000 ha)	Population (1000)	For. area/cap (ha/cap)	Ind.+Wood Prod. (1000 m3/yr)	Ind.+Wood Cons. (1000 m3/yr)	Cons/cap (m3/cap)	Cons. m3/ha/an	Prod. m3/ha/an	Net Sur/Def m3/ha/an	Exports tumwood	Exports (m.m.m.) panels	(1000m3/yr) pulp	paper	Total Exports (m.m.m.) total m3/r	Ind. Su Net Con. consumption
Mongolia	3500.00	1500.00		16000.	1563.00	5.35	1040.00	1042.00	.62	.10	.10	.00	.00	.00	.00	.00	.00	1040.00
Nepal	433.00	1695.00		2129.	17408.00	.15	560.00	454.00	.03	.20	.26	.06	.00	.00	.00	.00	.00	454.00
Oman							.00	.00	.02									
Pakistan	1253.00	2530.00		3785.	68399.00	.02	1250.00	1253.00	.02	.36	.35	.00	.00	.00	.00	.00	.00	1253.00
Qatar	.00	.00		.00	232.00	.00	.00	.00	.00				.00	.00	.00	.00	.00	
Saudi Arabia	.00	.00		.00	8960.00	.00	.00	.00	.00				.00	.00	.00	.00	.00	
Singapore																		
Sri Lanka	58.00	2726.00		2782.00	16815.00	.19	662.00	662.00	.05	.24	.24	.00	.00	.00	.00	.00	.00	665.00
Syria	40.00	50.00		90.00	8977.00	.01	34.00	56.00	.01	.47	.38	-.24	.00	.00	.00	.00	.00	56.00
Thailand	220.00	10155.00		10375.00	47653.00	.22	4458.00	4474.00	.10	.43	.43	.00	25.00	.00	.00	15.00	152.00	4626.00
Turkey	5166.00	3690.00		8856.00	45254.00	.26	5729.00	5452.00	.12	.62	.62	.03	48.00	2.00	.00	42.00	184.00	5617.00
U.A. Emirates	3.00	.00		3.00	.00	.00	.00	.00	.00				.00	.00	.00	.00	.00	
Vietnam	840.00	9970.00		10810.00	53740.00	.20	3339.00	3334.00	.06	.31	.30	.00	.00	.00	.00	.00	.00	3334.00
Yemen Ar	.00	.00		.00	157.00	.00	.00	.00										
Yemen Dem	2.00	.00		2.00	1858.00	.00	.09	5.00	.00	.00		.48	.00	.00	.00	.00	.00	5.00
Brunei	30.00	323.00		325.00	228.00	1.43	214.00	.00	.24	.18	.25	.07	.00	.00	.00	.00	.00	
Fiji	480.00	820.00		850.00	630.00	1.35	212.00	134.00	.09	.11	.23	.11	7.00	18.00	.00	.00	24.00	208.00
Indonesia	13.00	118955.00		123235.00	149833.00	.83	25181.00	23181.00	.17	.02	.02	.05	2298.00	4709.00	.00	56.00	1344.00	27994.00
New Caledonia	452.00	485.00		498.00	142.00	3.51	12.00	.00	.11	.06	.06	.04	17.00	1.00	.00	.00	36.00	650.00
Papua New Guinea	830.00	33795.00		34407.00	3154.00	10.92	2590.00	454.00	.08	.30	.45	.14	495.00	308.00	.00	4.00	1614.00	5529.00
Philippines	.00	11660.00		12510.00	49211.00	.25	5231.00	3711.00	.35	.39	.43	.04	1.00	.00	.00	.00	6.00	41.00
Samoa	2.00	142.00		142.00	157.00	.90	61.00	55.00	.31	.03	.17	.03	3.00	.00	.00	.00	6.00	77.00
Solomon Is	.00	2438.00		2440.00	229.00	10.54	455.00	71.00	.06	.03	.06	.05	.00	.00	.00	.00	.00	7.00
Vanuatu		241.00		241.00	118.00	2.04	14.00	7.00	.03	.42	.47	.00	.00	.00	.00	.00	.00	
TOTAL	**60179.00**	**433208.00**		**312387.00**	**2431189.00**	**.21**	**210574.00**	**210746.00**										**210746.00**
AFRICA																		
Algeria	410.00	80.00		490.00	18919.00	.03	236.00	531.00	.03	1.06	.48	-.58	.00	.00	.00	.00	.00	531.00
Angola	200.00	4271.00		4471.00	7078.00	.63	1004.00	1004.00	.11	.22	.22	.00	.00	.00	.00	.00	.00	1004.00
Benin	.00	47.00		47.00	3330.00	.01	229.00	229.00	.06	4.87	4.87	.00	.00	.00	.00	.00	.00	229.00
Botswana	.00	.00		.00	807.00	.00	74.00	74.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	74.00
Burkina Faso	.00	120.00		120.00	6900.00	.02	313.00	313.00	.05	2.61	2.61	.00	.00	.00	.00	.00	.00	313.00
Burundi	61.00	150.00		222.00	4241.00	.05	425.00	45.00	.01	1.91	1.91	1.71	.00	.00	.00	.00	12.00	45.00
Cameroon	10.00	18095.00		18105.00	8444.00	2.14	2777.00	1793.00	.21	.20	.15	.05	103.00	37.00	.00	.00	220.00	2073.00
Cape Verde		1.00		1.00	324.00	.00	.00	364.00	1.13	364.00	.00	-364.00	96.00	37.00	.00	.00	.00	364.00
Cen African Rep	.00	3595.00		3595.00	2294.00	1.57	427.00	-66.00	-.03	-.02	.12	.14	30.00	3.00	.00	.00	46.00	511.00
Chad	.00	532.00		532.00	4455.00	.12	517.00	511.00	.12	.97	.97	.00	.00	.00	.00	.00	.00	511.00
Congo	28.00	21480.00		21508.00	1537.00	13.99	748.00	531.00	.34	.04	.04	.02	23.00	46.00	.00	.00	138.00	659.00
Djibouti	3.00	3.00		6.00	318.00	.02	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
Egypt	.00	1.00		1.00	41963.00	.00	93.00	195.00	.09	195.00	95.00	-100.00	.00	.00	.00	.00	.00	195.00
Eq. Guinea	.00	1295.00		1295.00	363.00	3.57	160.00	33.00	.06	.03	.12	.10	6.00	.00	.00	12.00	45.00	
Ethiopia	812.00	4520.00		5332.00	31088.00	.17	1813.00	1893.00	.38	.34	.31	-.02	.00	.00	.00	.00	1893.00	
Gabon	.00	20890.00		20890.00	551.00	37.55	1434.00	485.00	.03	.02	.07	.05	3.00	.00	54.00	114.00	601.00	
Gambia	.00	78.00		78.00	603.00	.13	21.00	21.00	.03	.27	.27	.00	.00	.00	.00	.00	21.00	
Ghana	12.00	2459.00		2471.00	11679.00	.21	1125.00	925.00	.07	.33	.48	.15	86.00	14.00	.00	700.00	1056.00	
Guinea Bissau	.00	644.00		644.00	573.00	1.16	139.00	135.00	.21	.21	.21	.01	2.00	.00	.00	4.00	139.00	
Guinea	7.00	2865.00		2072.00	6014.00	.34	614.00	550.00	.10	.30	.30	-.23	.00	.00	.00	.00	698.00	
Ivory Coast	3.00	1904.00		4907.00	8008.00	.41	3613.00	-1182.00	-.11	-.23	.74	.97	475.00	16.00	.00	1142.00		
Kenya	2750.00	855.00		2605.00	14436.00	.18	1539.00	1553.00	.10	.60	.61	.01	3.00	.00	.00	12.00	1503.00	
Lesotho	.00	.03		.00	1311.00	.00	.00	.00					.00	.00	.00	2.00	.00	
Liberia	11.00	2052.00		2063.00	1987.00	1.05	475.00	363.00	.14	.13	.33	.16	6.00	.00	.00	12.00	221.00	
Libya	50.00	20.00		70.00	2977.00	.02	43.00	134.00	.04	1.00	1.41	.43	.00	.00	.00	.00	125.00	
Madagascar	1145.00	11615.00		12850.00	8742.00	1.49	807.00	807.00	.03	.02	.08	.00	.00	.00	.00	.00	807.00	
Malawi	690.00	299.00		989.00	6182.00	.16	311.00	311.00	.05	.31	.31	.00	.00	.00	.00	.00	311.00	

Table 1   continued

Country	Cl. E.forest (1000 ha)	Cl.Nc.forest (1000 ha)	Tot. Cl. forest (1000 ha)	Population (1000)	For. area/cap. (ha/cap)	Ind.R.Wood Prod. (1000 m3/r)	Ind.R.Wood Con. (1000 m3/r)	Cons/cap.t (m3/cap)	Cons. (m3/ha/an)	Prod. (m3/ha/an)	Net Sur/Def	Exports (m.o.o.) sawnwood	panels	pulp	paper	Total Exports (m.o.o.) total m3/r	Ind. Sd Net con. consumption
Mali	.00	19.00	19.00	8940.00	.00	319.00	319.00	.05	16.79	16.77	.03	.00	.00	.00	.00	.00	318.99
Mauritania	.00	.00	.00	1634.00	.00	5.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
Mauritius	.00	2.00	2.00	959.00	.00	7.00	9.00	.01	4.50	3.50	-1.06	.00	.00	.00	.00	.00	9.00
Morocco	200.00	200.00	400.00	20236.00	.02	714.00	732.00	.04	1.76	1.71	-.17	.00	10.00	61.00	.07	142.00	574.00
Mozambique	123.00	1066.00	1183.00	10473.00	.11	935.00	780.00	.09	.32	.42	.00	.00	2.00	.00	.00	4.00	781.00
Niger	.00	60.00	59.00	3318.00	.01	241.00	241.00	.05	4.15	4.15	.00	.00	.00	.00	.00	.00	241.00
Nigeria	22.00	7561.00	7533.00	77092.00	.10	7358.00	7807.00	.10	1.03	1.04	.01	1.00	.00	.00	.00	2.00	7805.00
Rwanda	44.00	344.00	412.00	4787.00	.09	240.00	240.00	.05	.59	.59	.00	.00	.00	.00	.00	.00	240.00
Senegal	.00	345.00	345.00	5661.00	.06	560.00	585.00	.10	1.76	1.62	-.07	.00	.00	.00	.00	.00	522.00
Sierra Leone	.00	798.00	798.00	3674.00	.20	140.00	140.00	.04	.18	.18	.00	.00	.00	.00	.00	.00	140.00
Somalia	66.00	1590.00	1590.00	4637.00	.13	65.00	68.00	.01	.04	.04	.00	.00	.00	.00	.00	.03	65.00
Sudan	37.00	2495.00	2532.00	18871.00	.13	1093.00	1093.00	.10	.75	.75	.00	.00	.00	.00	.00	.03	1093.00
Swaziland	76.00	36.00	100.00	534.00	.18	1643.00	919.00	1.71	9.69	16.63	7.11	76.00	8.00	174.00	.00	516.00	1165.00
Tanzania	816.00	1842.00	2658.00	17934.00	.15	1494.00	1478.00	.08	.56	.56	.01	0.00	.00	.00	.00	16.00	1464.00
Togo	.00	304.00	304.00	2625.00	.12	138.00	168.00	.06	.53	.56	.00	.00	.00	.00	.00	.00	168.00
Tunisia	130.00	270.00	400.00	6363.00	.06	114.00	140.00	.07	.35	.29	-.07	.00	.00	.00	.00	.00	140.00
Uganda	114.00	765.00	879.00	13291.00	.07	1587.00	1587.00	.13	1.92	1.92	.00	.00	.00	.00	.00	.00	1587.00
Zaire	10.00	105963.00	105975.00	28791.00	3.25	2584.00	2372.00	.08	.02	.02	.00	26.00	21.00	.00	.00	100.00	2472.00
Zambia	243.00	3147.00	3396.00	5766.00	.59	525.00	537.00	.09	.18	.18	.00	.00	.00	.00	.00	.00	537.00
Zimbabwe	65.00	400.00	465.00	7376.00	.06	1335.00	1272.00	.17	2.74	2.86	.13	24.00	1.00	.00	.00	58.00	1330.00
TOTAL	7131.00	227322.00	234453.00	400035.00	.53	42167.00	35971.00	.08	.15	.18	.02				4.00		35471.00
Total Dev. Co.	131832.00	1354250.00	1486080.00	3240810.00	.46	348700.00	355360.00	.11	.24	.24	.01						5621.00

ANNEX I   Table 2
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Wood industry classification system country data on raw material surplus/deficit

CENTRAL AND LATIN AMERICA		ASIA		AFRICA	
Country	Net Sur/Def (m3/ha/an)	Country	Net Sur/Def (m3/ha/an)	Country	Net Sur/Def (m3/ha/an)
Chile	.71	Malaysia	1.27	Swaziland	7.14
Paraguay	.14	Brunei	.66	Burundi	1.71
Honduras	.10	Lebanon	.60	Ivory Coast	.97
Costa Rica	.04	Philippines	.16	Liberia	.18
Uruguay	.03	Jordan	.15	Ghana	.15
El Salvador	.03	Solomon Is	.15	Cen African Rep	.14
Argentina	.03	Indonesia	.11	Zimbabwe	.13
Guatemala	.02	Fiji	.07	Eq. Guinea	.10
Brazil	.01	Nepal	.06	Cameroon	.05
Jamica	.01	Samoa	.04	Gabon	.05
Ecuador	.01	Papua New Guinea	.04	Congo	.02
Nicaragua	.01	Turkey	.03	Nigeria	.01
FR Guiana	.00	Vanuatu	.03	Kenya	.01
Belize	.00	New Caledonia	.02	Guinea Bissau	.01
Mexico	.00	Bangladesh	.02	Tanzania	.01
Surinam	.00	Burma	.01	Mozambique	.00
Guyana	.00	Laos	.00	Guinea	.00
Colombia	.00	Bhutan	.00	Zaire	.00
Bolivia	.00	India	.00	Niger	.00
Peru	.00	Kampuchea Dm	.00	Burkina Faso	.00
Panama	.00	Afghanistan	.00	Uganda	.00
Dominica	.00	Sri Lanka	.00	Madagascar	.00
Guadelope	.00	Mongolia	.00	Somalia	.00
Haiti	.00	Iraq	.00	Angola	.00
Venezuela	.00	Thailand	.00	Benin	.00
Trinidad Tob	-.01	Vietnam	.00	Chad	.00
Cuba	-.01	Pakistan	.00	Djibouti	.00
Martinique	-.01	Korea DPR	-.01	Malawi	.00
Dominican Rep.	-.05	Iran	-.06	Mali	.00
Puerto Rico		China	-.08	Rwanda	.00
		Bahrain	-.20	Sierra Leone	.00
TOTAL	.00	Syria	-.24	Sudan	.00
		Korea Rep	-.98	Togo	.00
		Kuwait	-8.00	Gambia	.00
		Oman		Zambia	.00
		Qatar		Ethiopia	-.02
		Saudi Arabia		Tunisia	-.07
		U.A. Emirates		Senegal	-.07
		Yemen Ar		Morocco	-.17
		Yemen Dem		Libya	-.43
				Algeria	-.58
		TOTAL	.00	Mauritius	-1.00
				Egypt	-100.00
				Cape Verde	-364.00
				Botswana	
				Lesotho	
				Mauritania	
				TOTAL	.03

Statistics on wood industry for 24 selected countries, on the primary wood industry and balance of trade

Country	Sub/GDP (a3/ha/an)	For. Area (1000 ha)	Stock (1000000 a3)	Pop (1000)	Ind.R.Prod (1000 a3 r)	Pulp Prod. (1000 t)	PltB Prod. (1000 t)	WBP Prod. (1000 a3)	Sawn.Prod. (1000 a3)	Poles (1000 a3)	Tot.Prod. (1000 a3)	App.Conv	Pulp Exp (1000 t)	Paperb.B (1000 t)	Panel Exp (1000 a3)	Sawnwood (1000 a3)	Tot. Exp (1000 a3)
CENTRAL AND LATIN AMERICA																	
Chile	.71	8680	1290	11107	10193	5239	398	239	2287	553	4313	2.36	565	116	0	857	150
Costa Rica	.04	1661	154	2210	509	3	13	46	412	185	659	.77	0	0	21	0	35
Brazil	.01	553038	47008	132320	64128	3839	4485	2546	18043	5245	30170	1.84	880	692	477	455	2564
Nicaragua	.01	4500	519	2737	890	0	0	14	222	50	286	3.38	0	0	0	0	12
Mexico	.00	47200	2032	68752	7840	550	2869	841	2141	237	6241	1.18	0	12	15	22	51
Peru	.00	71140	8137	17625	1210	1	152	42	535	88	818	1.53	0	0	1	3	11
Cuba	-.01	3025	52	9732	525	0	132	123	104	359	709	.80	0	0	0	0	0
Dominican Rep	-.05	685	24	5946	6	0	10	0	0	3	13	.46	0	0	0	0	0
TOTAL		691072	10761	240437	86499												
ASIA																	
Malaysia	1.27	21756	3735	14868	13395	0	73	1529	5491	614	7707	1.74	0	0	833	3081	2916
Indonesia	.11	126235	13823	148033	28181	137	611	5751	7057	2631	11107	1.75	0	58	4109	2758	6913
Nepal	.06	2300	95	14280	340	0	7	0	220	0	272	2.57	0	0	0	0	0
Burma	.01	32101	3811	35538	2940	0	23	13	483	1135	1656	1.78	0	12	33	61	74
Thailand	.00	16815	325	47063	4450	0	592	313	1027	2445	4207	1.06	0	0	0	25	38
Iran	-.06	12200	600	38126	4326	0	70	51	163	4007	4302	1.03	0	12	0	0	0
China	-.03	126000	9500	949913	91256	1650	11377	3109	26391	34050	76985	1.31	0	608	528	67	997
Korea Rep	-.98	6515	13	38455	230	287	2773	1185	3563	953	8759	.36	29	281	208	170	730
TOTAL		387630	31902	1330235	156552												
AFRICA																	
Swaziland	7.14	150	15	554	1663	108	0	3	136	76	397	4.19	126	0	0	26	358
Zimbabwe	.13	15643	117	7336	1332	24	75	31	127	930	1175	1.13	0	4	0	22	21
Kenya	.01	3860	61	16464	1509	33	106	65	181	869	1290	1.26	0	7	0	3	5
Zaire	.00	177813	20014	28271	2584	0	7	53	131	2135	2311	1.12	0	0	22	22	95
Malawi	.00	3074	5	6262	311	0	0	1	17	263	283	1.18	0	0	0	0	0
Sierra Leone	.00	2113	35	3474	110	0	0	0	11	120	131	1.01	0	0	0	0	0
Ethiopia	-.02	28132	136	31468	1813	0	10	15	16	1763	1763	1.09	0	0	0	0	0
Egypt	-100.00	31		41983	95	0	145	41	45	95	281	.33	0	0	0	0	0
TOTAL		232860	20383	135876	9527												

Table 2 Table 1 continued

Statistics on wood industry for 2X selected countries, on the primary wood industry and balance of trade

Country	Pulp Imp (1000 t)	Pulp,P.B.Imp (1000 t)	Panel Imp (1000 m3)	Sawwood (1000 m3)	Int. Imp. (1000 m3)	App. Cons. (1000 m3)	App.Con/cap (m3/cap)	App.Cons.Pulp (m3/cap)	App.Cons.P&PB (m3/cap)	App.Cons.I&P (m3/cap)	App.Cons.Saw (m3/cap)
CENTRAL AND LATIN AMERICA											
Chile	0	33	0	0	33	7127	.44	.03	.02	.02	.13
Costa Rica	1	119	0	0	120	679	.31	.00	.06	.01	.10
Brazil	41	259	56	424	780	62680	.51	.02	.03	.02	.15
Nicaragua	0	11	0	0	11	078	.32	.00	.00	.00	.08
Mexico	307	156	44	329	876	8482	.13	.01	.01	.01	.04
Peru	44	71	0	7	122	1432	.08	.00	.01	.00	.03
Cuba	43	205	115	1	346	1257	.13	.00	.03	.02	.01
Dominican Rep	0	57	12	42	111	220	.04	.00	.01	.00	.01
TOTAL											
ASIA											
Malaysia	7	361	41	0	490	6547	.47	.00	.03	.05	.18
Indonesia	107	177	0	0	344	14963	.10	.00	.00	.01	.03
Nepal	0	0	0	0	0	560	.04	.00	.00	.00	.02
Burma	0	21	0	0	21	2704	.08	.00	.00	.00	.01
Thailand	100	173	5	204	482	5336	.11	.00	.01	.01	.02
Iran	33	125	98	102	331	5673	.13	.00	.01	.00	.01
China	803	1356	591	708	3356	99334	.10	.00	.01	.00	.03
Korea Rep	729	115	0	293	1137	3200	.08	.02	.07	.03	.10
TOTAL											
AFRICA											
Swaziland	0	0	0	0	0	1187	2.06	.01	.00	-.01	.11
Zimbabwe	17	12	1	3	33	1330	.18	.01	.01	.00	.01
Kenya	0	15	1	0	16	1611	.10	.00	.01	.00	.51
Zaire	3	7	2	0	4	2696	.09	.00	.00	.00	.09
Malawi	0	12	2	0	11	339	.05	.02	.00	.00	.06
Sierra Leone	0	0	1	0	1	142	.06	.00	.00	.00	.01
Ethiopia	10	41	0	0	21	1855	.06	.00	.02	.00	.01
Egypt	0	621	217	1767	2905	5705	.11	.00	.02	.01	.04
TOTAL											

Annex 2   Table :
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Statistics on GDP, industrial capacity and wood industry manufacturing value added (MVA) for 34 selected countries

	GDP (US$ million)	GNP Growth	GNP/cap (US$)	Industrial % of GDP	Manuf. wood Prod. % of GDP	Furniture Prod. % of GDP	Total MVA	% Growth MVA	Per cap MVA	MVA per SK	% Forest Prod. for export	Woodbased Panels Prod. Capacity (1000 m3)	Pulp Prod. Capacity (1000 t)	Sawnwood Panels Prod. Capacity (1000 m3)	Sawnwood Production Capacity (1000 m3)	Total Production Capacity (1000 m3)
CENTRAL AND SOUTH AMERICA																
Chile	21900.00	6.30	1870.00	29.40							8.90	110.00	925.00	.20	2382.00	2227.00
Costa Rica	3400.00	3.40	1020.00	26.00								137.00	.00	.00	412.00	452.00
Brazil	243000.00	6.40	1800.00	27.70								3620.00	4330.00	175.20	18062.00	25236.00
Nicaragua	1725.00	2.40	790.00	28.00								47.00	.00	.00	222.00	269.00
Mexico	168000.00	3.20	2200.00	24.40								689.00	765.70	395.00	2145.00	3596.00
Peru	18600.00	1.80	1040.00	41.00		44.90						152.00	15.00	206.00	555.00	923.00
Cuba	17800.00	6.00	1560.00									39.00	.00	198.00	594.00	851.00
Dominican Rep.	8390.00	3.40	1370.00	32.00	44.60	44.60						7.50	.00	.04	42.00	44.50
ASIA																
Malaysia	29300.00	7.30	1900.00	35.00			4831.76	32.40	526.00	.10		694.00	77.00	.00	5451.00	5652.00
Indonesia	84900.00	7.80	530.00	42.00	74.00	10.00	5153.80	30.70	41.00	-2.40		543.00	417.00	417.00	7224.00	1164.00
Nepal	1530.00	3.80	148.00	2.50			34.70		4.00	-1.00		4.00	.00	5.00	220.00	331.00
Burma	3396.00	6.00	170.00	11.00			303.30	5.10	14.00	-5.30		15.00	.00	30.30	133.00	519.00
Thailand	62000.00	8.70	860.00	28.30			8115.60	9.00	139.00	.70		174.00	.00	245.00	1299.00	1226.00
...	22600.00	12.00	5155.00	59.00						-3.70		353.00	255.00	60.00	182.00	671.00
Costa	21163.00	15.00	398.00	46.00				11.50		1.80		2387.00	1070.00	1725.00	24371.00	25523.00
Korea Rep	81200.00	7.30	2110.00	40.00			12334.30		453.00	6.10		2444.00	570.00	.00	2565.00	6597.00
AFRICA																
Zambia	400.00	9.00	480.00	38.00	7.60	1.30	182.70	2.70	234.00	.10		5.90	100.00	.00	126.40	131.00
Zimbabwe	5900.00	2.30	743.00	25.03	3.30		1370.2	1.10	166.00	-3.10		.30	30.00	.00	127.00	140.00
Kenya	8900.00	3.30	420.00	21.00	1.50	-1.90	721.10	-1.10	35.00	-1.00		25.00	75.00	11.00	191.30	295.00
Zaire	3440.00	-1.00	180.00	18.00	2.30	.50	71.80	-2.50	3.00	-5.30		33.00	.00	.00	251.00	156.00
Malawi	480.00	6.10	200.00	22.00			174.40	2.30	26.00	.70		6.00	.00	.00	17.00	22.00
Sierra Leone	620.00	2.00	200.00	23.00	2.20		127.50	-1.00	34.00	-3.70		.00	.00	.00	19.00	15.00
Ethiopia	4130.00	5.00	180.00	15.00	.70	.00	559.50	4.10	16.00	1.00		22.00	.00	.00	45.00	67.00
Egypt	36100.00	4.00	773.00	13.00		.30	3423.60	0.70	182.00	0.10		44.00	.00	35.00	1767.30	1100.00

24 sample countries ranked according to their net wood raw material deficit/surplus

COUNTRY	SUR/DEF (m3/ha/an)	GDP (US$ millions)	Total Man. Capacity (1000 m3)	GNP/capita (US$)	Industrial % of GDP
Egypt	-100.00	34163.00	1900.00	775.00	13.00
Korea Rep	-.98	83200.00	6397.00	2110.00	40.00
China	-.98	311162.00	39528.00	292.00	44.00
Iran	-.05	226260.00	671.00	5155.00	52.00
Dominican Rep	-.05	8200.00	49.50	1370.00	32.00
Ethiopia	-.02	4420.00	67.00	140.00	15.00
Cuba	-.01	17800.00	251.00	1560.00	
Zaire	.00	5440.00	156.00	180.00	18.00
Malawi	.00	450.00	23.00	200.00	22.00
Sierra Leone	.00	620.00	19.00	265.00	23.00
Mexico	.00	168900.00	3999.00	2240.00	24.40
Thailand	.00	42900.00	1339.00	866.00	28.00
Peru	.00	18600.00	998.00	1046.00	41.00
Burma	.01	3636.00	518.00	120.00	11.00
Kenya	.01	6965.00	252.00	420.00	21.00
Brazil	.01	243300.00	25236.00	1890.00	27.70
Nicaragua	.01	1725.00	269.00	750.00	28.00
Costa Rica	.04	2400.00	539.00	1620.00	26.00
Nepal	.06	1539.00	229.00	160.00	2.50
Indonesia	.11	84960.00	8494.00	530.00	42.00
Zimbabwe	.13	5906.00	166.00	783.00	35.00
Chile	.71	21900.00	3327.00	1870.00	20.40
Malaysia	1.27	29300.00	55492.00	1460.00	35.00
Swaziland	7.14	402.00	321.00	690.00	38.00

24 sample countries ranked according to their GDP

COUNTRY	SUR/DEF (m3/ha/an)	GDP (US$ millions)	Total Ind. Capacity (1000 m3)	GDP/capita (US$)	Industrial % of GDP
Swaziland	7.14	402.00	321.00	690.00	33.00
Malawi	.00	450.00	23.00	200.00	22.00
Sierra Leone	.00	620.00	19.00	200.00	23.00
Nepal	.06	1539.00	229.00	168.00	2.50
Nicaragua	.01	1725.00	269.00	750.00	28.00
Costa Rica	.04	2490.00	539.00	1020.00	26.50
Burma	.01	3696.00	518.00	120.00	11.00
Ethiopia	-.02	4436.00	67.00	140.00	15.00
Zaire	.00	5446.00	156.00	160.00	19.00
Zimbabwe	.13	5900.00	166.00	768.00	35.00
Kenya	.01	6960.00	292.00	420.00	21.00
Dominican Rep	-.05	8200.00	49.50	1370.00	32.00
Cuba	-.01	17900.00	251.00	1560.00	
Peru	.00	18600.00	998.00	1040.00	41.00
Chile	.71	21900.00	3327.00	1870.00	29.40
Malaysia	1.27	29300.00	55692.00	1930.00	35.00
Egypt	-100.00	36160.00	1900.00	773.00	13.00
Thailand	.00	42000.00	1339.00	860.00	28.00
Korea Rep	-.78	83200.00	6397.00	2130.00	40.00
Indonesia	.11	84960.00	8494.00	530.00	42.00
Mexico	.00	168000.00	3900.00	2240.00	24.40
Iran	-.06	226200.00	671.00	5155.00	59.00
Brazil	.01	243800.00	25236.00	1860.00	27.70
China	-.08	311168.00	39528.00	293.00	44.00

24 sample countries ranked according to their industrial % of GDP

COUNTRY	SUR/DEF (m3/ha/an)	GDP (US$ millions)	Total Man. Capacity (1000 m3)	GNP/capita (US$)	Industrial % of GDP
Nepal	.04	1539.00	229.00	158.00	2.50
Burma	.01	3696.00	518.00	129.00	11.00
Egypt	-100.00	36166.00	1900.00	773.00	13.00
Ethiopia	-.02	4430.00	67.00	140.00	15.00
Zaire	.00	5440.00	156.00	126.00	18.00
Chile	.71	21900.00	3327.00	1870.00	20.40
Kenya	.01	6960.00	292.00	420.00	21.00
Malawi	.00	480.00	23.00	200.00	22.00
Sierra Leone	.00	620.00	19.00	200.00	23.00
Mexico	.00	168000.00	3900.00	2240.00	24.40
Costa Rica	.04	2406.00	539.00	1020.00	26.00
Brazil	.01	243800.00	25236.00	1890.00	27.70
Nicaragua	.01	1725.00	269.00	750.00	28.00
Thailand	.00	42000.00	1339.00	860.00	28.00
Dominican Rep	-.05	8200.00	49.50	1370.00	32.00
Zimbabwe	.13	5900.00	166.00	788.00	35.00
Malaysia	1.27	29300.00	55692.00	1930.00	35.00
Swaziland	7.14	408.00	321.00	650.00	38.00
Korea Rep	-.98	83200.00	6397.00	2110.00	40.00
Peru	.09	18600.00	978.00	1040.00	41.00
Indonesia	.11	84960.00	8494.00	530.00	42.00
China	-.03	311168.00	39523.00	299.00	44.00
Iran	-.05	226800.00	671.00	5155.00	59.00
Cuba	-.01	17800.00	251.00	1520.00	

24 sample countries ranked according to their total wood product manufacturing capacity

COUNTRY	SUR/DEF (m3/ha/an)	GDP (US$ millions)	Total Man. Capacity (1000 m3)	GNP/capita (US$)	Industrial % of GDP
Sierra Leone	.00	620.00	19.00	200.00	23.00
Malawi	.00	490.00	23.00	205.00	22.00
Dominican Rep	-.05	8200.00	49.50	1370.00	32.00
Ethiopia	-.02	4430.00	67.00	140.00	15.00
Zaire	.00	5440.00	156.00	150.00	18.00
Zimbabwe	.13	5900.00	166.00	780.00	35.00
Nepal	.04	1539.00	229.00	160.00	2.50
Cuba	-.01	17800.00	251.00	1560.00	
Nicaragua	.01	1725.00	267.00	750.00	28.00
Kenya	.0*	6960.00	292.00	420.00	21.00
Swaziland	7.14	408.00	321.00	690.00	38.00
Burma	.01	3696.00	512.00	125.00	11.00
Costa Rica	.04	2490.00	539.00	1020.00	26.00
Iran	-.06	226800.00	671.00	5155.00	59.00
Peru	.00	18600.00	998.00	1040.00	41.00
Thailand	.00	42000.00	1337.00	860.00	23.00
Egypt	-100.00	36160.00	1909.00	773.00	13.00
Chile	.71	21900.00	3327.00	1670.00	20.40
Mexico	.00	168000.00	3900.00	2240.00	24.40
Korea Rep	-.96	83200.00	6397.00	2110.00	40.00
Indonesia	.11	84950.00	8494.00	530.00	42.00
Brazil	.01	243800.00	25236.00	1830.00	27.70
China	-.08	311160.00	37528.00	398.00	44.00
Malaysia	1.27	29300.00	55592.00	1920.00	35.00

ANNEX 3   Table 5

24 sample countries ranked according to their GNP / capita

COUNTRY	SUR/DEF (m3/ha/an)	GNP (US$ millions)	Total Man. Capacity (1000 m3)	GNP/capita (US$)	Industrial % of GDP
Burma	.01	3695.00	519.00	120.00	11.00
Ethiopia	-.02	4430.00	67.00	140.00	15.00
Nepal	.06	1535.00	229.00	162.00	2.50
Zaire	.00	5440.00	156.00	190.00	18.00
Sierra Leone	.00	620.00	19.00	200.00	23.00
Malawi	.00	499.00	23.00	200.00	22.00
China	-.08	311153.00	39528.00	293.00	44.00
Kenya	.01	6960.00	292.00	420.00	21.00
Indonesia	.11	84960.00	8494.00	530.00	42.00
Swaziland	7.14	468.00	321.00	680.00	38.00
Nicaragua	.01	1725.00	267.00	750.00	28.00
Egypt	-100.00	36160.00	1900.00	773.00	13.00
Zimbabwe	.13	5900.00	166.00	783.00	35.00
Thailand	.00	42000.00	1339.00	860.00	28.00
Costa Rica	.04	2400.00	539.00	1020.00	26.00
Peru	.00	18660.00	998.00	1040.00	41.00
Dominican Rep	-.05	8200.00	49.50	1370.00	32.00
Cuba	-.01	17800.00	251.00	1560.00	
Chile	.71	21900.00	3327.00	1370.00	20.40
Brazil	.01	243800.00	25236.00	1880.00	27.70
Malaysia	1.27	29300.00	55692.00	1980.00	35.00
Korea Rep	-.98	83200.00	6397.00	2110.00	40.00
Mexico	.00	168000.00	3706.00	2240.00	24.40
Iran	-.06	226000.00	671.00	5155.00	59.00

24 sample countries ranked according to their wood product manufacturing capacity/capita

COUNTRY	SUR/DEF (m3/ha/an)	Population (1000)	GDP (US$ millions)	Total Man. Capacity (1000 m3)	GNP/capita (US$)	Industrial % of GDP	Man. Capacity / capita (m3)
Malaysia	1.27	14069.00	29300.00	55692.00	1980.00	35.00	3.96
Swaziland	7.14	556.00	408.00	321.00	680.00	36.00	.53
Chile	.71	11197.00	21900.00	3327.00	1970.00	29.40	.30
Costa Rica	.04	2219.00	2400.00	539.00	1020.00	26.00	.24
China	-.08	170000.00	311168.00	39528.00	298.00	44.00	.23
Brazil	.01	122320.00	243800.00	25236.00	1820.00	27.70	.21
Korea Rep	-.93	38455.00	83200.00	6397.00	2110.00	40.00	.17
Nicaragua	.01	2737.00	1725.00	269.00	750.00	28.00	.10
Indonesia	.11	142023.00	84960.00	8494.00	530.00	42.00	.06
Mexico	.00	63752.00	168000.00	3900.00	2240.00	24.40	.06
Peru	.00	17625.00	18600.00	993.00	1040.00	41.00	.06
Egypt	-100.00	41963.00	36160.00	1990.00	773.00	13.00	.05
Thailand	.00	47063.00	42000.00	1339.00	860.00	28.00	.03
Cuba	-.01	9732.00	17800.00	251.00	1560.00		.03
Zimbabwe	.13	7396.00	5900.00	166.00	788.00	35.00	.02
Kenya	.01	16486.00	6960.00	292.00	420.00	21.00	.02
Iran	-.06	38126.00	226800.00	671.00	5155.00	59.00	.02
Nepal	.06	14299.00	1539.00	229.00	163.00	2.90	.02
Burma	.01	35289.00	3696.00	518.00	-...00	11.00	.01
Dominican Rep	-.05	5946.00	8200.00	45.50	1370.00	32.00	.01
Zaire	.00	28291.00	5440.00	156.00	180.00	18.00	.01
Sierra Leone	.00	3474.00	620.00	19.00	200.00	23.00	.01
Malawi	.00	6252.00	480.00	23.00	200.00	22.00	.00
Ethiopia	-.02	31458.00	4430.00	67.00	140.00	15.00	.00

24 sample countries ranked according to their total wood manufacturing capacity by region

Country	SuR/DEF (m3/ha/yr)	Population (1000)	GDP (US$ millions)	Total Man. Capacity (1000 m3)	GNP/capita (US$)	Industrial % of GDP	Man. Capacity / capita (m3)
CENTRAL AND LATIN AMERICA							
Dominican Rep	-.05	5946	8200	50	1370	32	.01
Cuba	-.01	9732	17800	251	1560		.03
Nicaragua	.01	2737	1725	269	750	28	.10
Costa Rica	.04	2218	2400	539	1020	26	.24
Peru	.00	17625	18600	998	1040	41	.06
Chile	.71	11107	21900	3327	1870	20	.30
Mexico	.00	68752	158000	3900	2240	24	.06
Brazil	.01	122329	243800	25236	1890	28	.21
ASIA							
Nepal	.06	14298	1539	229	146	3	.02
Burma	.01	35289	3696	518	120	11	.01
Iran	-.05	38126	226800	671	5155	59	.02
Thailand	.00	47063	42000	1339	860	28	.03
Korea Rep	-.96	38455	83200	6397	2110	40	.17
Indonesia	.11	148033	34960	8494	530	42	.06
China	-.08	1070000	311163	39528	298	44	.23
Malaysia	1.27	14069	29300	55692	1980	35	3.96
AFRICA							
Sierra Leone	.00	3474	620	19	200	23	.01
Malawi	.60	6262	480	23	200	22	.00
Ethiopia	-.02	31469	4430	67	140	15	.00
Zaire	.00	28291	5440	156	180	18	.01
Zimbabwe	.13	7396	5900	166	786	35	.02
Kenya	.01	16456	6980	292	420	21	.02
Swaziland	7.14	556	403	321	680	38	.58
Egypt	-100.00	41952	36160	1900	773	13	.05