

## Bamboo and rattan products and trade

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**Abstract**—Forest cover in most of the developed countries has stabilized and tends to grow increasing quality and growing stock. The situation in most of the developing countries is just opposite. Population pressure, growing agriculture, shifting cultivation, widespread use of wood for fuel, inefficient processing and the economic development agenda cause forest devastation and desertification in the developing world. In the meantime, most of the developing countries in tropical and subtropical areas have a good option to partly substitute timber for alternatives such as bamboo and rattan. Recent statistical trends reveal a changing paradigm of bamboo and rattan management and use.

*Key words:* Bamboo; rattan; data on products and trade.

### INTRODUCTION TO BAMBOO AND RATTAN

While the world population and global economy are growing the demand for wood is increasing and the world forest is shrinking. Forest deficit becomes a serious problem in the countries with dynamic economic growth such as China.

The present annual consumption of wood in China is equivalent to 250 million m<sup>3</sup>, including import of timber products of US\$ 3 billion total value. Per capita consumption of forest products remains low in China. Round wood consumption makes up 0.2 m<sup>3</sup>, sawn wood 0.02 m<sup>3</sup>, paper — 25 kg per capita, which is much below the world averages [1, 2]. Timber shortfall in China now is about 40 million m<sup>3</sup>. While China will develop its economy its demand for wood will increase. With the new environmental regulations the timber shortfall may reach 60 million m<sup>3</sup> by 2010.

One of the possible solutions of the problem is wider utilization of wood substitutes. First of all it concerns a family of woody plants — close relatives to wood plants — called bamboo. Bamboo is an ancient woody grass. The plant encompasses 1250 species of 75 genera. It can be from 10 cm to 40 m high.

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The most popular industrial species can be normally harvested after 3–7 years of cultivation, unlike timber which may need over a 100 years rotation.

Total world bamboo forest area makes up over 22 million ha. Countries with the largest bamboo growing stock are China, India, Bangladesh, Philippines and Thailand. China alone has about 300 species of 44 genera occupying over 7.2 million ha, including 4.2 million ha of pure bamboo forests and 3 million ha scattered around the country mostly in high mountains [3].

### *Bamboo and rattan products*

Bamboo is widely known as the ‘poor man’s timber’, and there is lack of awareness of the huge potential of bamboo as an incredibly valuable raw industrial material. However, bamboo has certain advantages, which make it a very valuable industrial substitute for wood. Bamboo is a renewable and environmentally friendly material. Bamboo is abundant, fast growing, has good physical properties, high toughness and strength. Bamboo is hard, abrasion-resistant, durable material and elegant crop. Bamboo plays a significant role in the conservation of soil and water, ecological balance, nutrient circulation of woodland. Bamboo forests are often called ‘second forest’. Bamboo forests significantly contribute to carbon sequestration and other environmental values. List of traditional and non-traditional industrial uses of bamboo is impressive and is still growing with the new technological advances:

- Artifacts and handicrafts — traditional use of bamboo.
- Bamboo furniture — traditional and non-traditional industrial design.
- Construction and architecture.
- Other bamboo constructions including gas generators, water, grain tanks, store rooms, etc.
- Bamboo scaffolding.
- Bamboo mats, panels and boards, doors, window frames and decorative materials.
- Plybamboo and veneer.
- Bamboo composite materials together with plastic and wood fibre.
- Flooring and roofing.
- Pulp and paper.
- Charcoal, gas and oil from bamboo.
- Cattle feed.
- Medicine and perfume.
- Ornamental purposes and ecotourism.
- Water conservation and soil protection.
- Reclamation of degraded lands.

## CHINESE BAMBOO AND RATTAN RESOURCES, PRODUCTION AND TRADE

By the beginning of the new century the total value of China's bamboo output was approximately US\$ 2 billion. Bamboo export made up about US\$ 400 million. Since the 1980s the production and value of bamboo have increased very fast. Ecolabelling is a powerful tool for marketing of bamboo and rattan *versus* tropical timber.

### *Bamboo and rattan resources*

The Fifth Forest Inventory, held by the Chinese Ministry of Forestry, shows that the total area of bamboo plantations is 4.2 million ha, 3% of the total forest area in China (Table 1). In the past two decades bamboo resources continued growing. Bamboo plantations area and growing stock have increased from 3.1 million hectares and 64 million tones in 1981 to 4.2 million ha and 109 million tones by the beginning of the new century. Industrially valuable Moso bamboo (*Phyllostachys pubescens* M) occupies about 70% of bamboo forestland and some 80% of the growing stock.

Natural rattan grows predominantly in tropical and subtropical forests. In China rattan resources are at the edge of exhaustion due to the growing industrial demand and deteriorating natural forest growth conditions. To date there is no reliable statistics on rattan area and growing stock. Rattan area is estimated to be 2000 ha. The main species are *Daemonorops margaritae* (Hance) Becc, *C. tetradactylus* Hance, *C. simplicifolius* C.F. Wei and *C. dioicus* Lour. At present native Chinese stock of rattan can only meet 10–20% of the domestic total demand.

### *Bamboo and rattan production and consumption*

The bamboo sector consists of harvesting, processing and trade activities. Harvesting includes both culms and bamboo eatable shoots. Recently, on average over 10 million tonnes of bamboo poles are harvested in China annually, including 7.5 million tonnes (or 500 million culms) of Moso bamboo and 3.5 million tonnes of the other bamboo species. Total annual bamboo harvesting is more than 12.5 millions m<sup>3</sup> of timber or around 14% of the national annual industrial round wood production [4]. In addition, China produces more then 2 million tonnes of bamboo shoots (Table 2).

**Table 1.**

China's bamboo land and bamboo resources, 1000 ha and 1000 tons

Period	Total		Moso bamboo		Other bamboo	
	Area	Volume	Area	Volume	Area	Volume
1979–1981	3199.6	64 746	2229.0	53 496	750.0	11 250
1984–1988	3523.6	76 288	2503.7	59 970	1019.9	16 318
1989–1993	3790.8	96 323	2602.6	74 930	1188.5	21 393
1993–1998	4210.8	109 480	2912.7	86 277	1289.1	23 203

**Table 2.**

Quantity and value of bamboo materials and shoots in China from 1980 to 1997, in 1000 tons and million yuan

Year	Bamboo materials		Bamboo shoots		Total value
	Quantity	Value	Quantity	Value	
1980	4381	344.8	420	67.2	412.0
1985	5115	678.1	464	162.5	849.6
1990	7279	1427.7	836	835.5	2263.2
1995	10995	5503.6	1746	2269.3	7772.9
1997	11003	5567.5	2172	3040.9	8608.4
1997 to 1980, %	2512	1614.7	5171	4525.1	2089.4

Source: [5].

**Table 3.**

Estimated annual output values for the Chinese bamboo processing sector in the mid-1990s

Item	Output value (billion yuan)	Share (%)
Bamboo manufactured commodities	6.47	67.5
In which:		
Bamboo mat	3.36	35.1
Man-made bamboo plank	1.20	12.5
Bamboo flooring	0.54	5.6
Bamboo paper	1.40	14.6
Processed bamboo shoots	1.71	17.9
Total	9.58	100.0

Source: [5].

Since 1980 to 1997 the total value of bamboo materials and shoots has increased from 412 million to 8608 million yuan. During 1980–1997 the total value of bamboo sector grew by 19.9 times, much higher than forestry (9.0 times) and agriculture (11.8 times) for the same period of time [6]. The share of bamboo shoots production grew especially quickly from 16% in 1980 to some 35–40% in the recent years.

The estimated average annual output of Chinese bamboo processing sector is presented in Table 3. The total value of the bamboo processing in the mid-1990s was about 9.58 billion yuan. Bamboo mat was the leading commodity (35.1%) followed by bamboo shoots (17.9%), paper (14.6%), plank (12.5%) and flooring (5.6%).

The total output of the bamboo sector in the mid-1990s made up 18.2 billion yuan (about US\$ 2.2 billion) both from materials and shoots (8.608 billion yuan) and processing (9.58 billion yuan). According to Table 4 prices for the main bamboo commodities have increased by 600% since 1980, two times more than farm products or retail commodities index [7].

**Table 4.**  
Price dynamics of bamboo products and price index

Year	Moso bamboo >6 cm (yuan/pole)	Moso bamboo <6 cm (yuan/pole)	Other bamboo (yuan/ton)	Bamboo shoots (yuan/kg)	Hand-made bamboo paper (yuan/ton)	Price index of bamboo (1978 = 100%)
1980	0.95	0.4	79.7	0.15	1330	133
1985	1.67	1.0	162.8	0.30	1587	288
1990	3.50	2.0	299.2	1.00	2289	483
1993	6.1	3.0	460.0	1.40	2500	531
1993 to 1980 (%)	642	750	577	933	188	590

Source: [8].

High elasticity of the bamboo commodities prices should be considered to develop economy and improve the life of the people in bamboo areas. For instance in Linan county of Zhejiang Province one hectare of *Phyllostachys heterocycla var. pubescens* (Moso bamboo) can produce an average annual income from shoots production of about 15 000 yuan (US\$ 1870). One hectare of *Phyllostachys praecox* can yield an average annual income of 45 000 yuan (US\$ 5625).

#### *Bamboo and rattan trade data*

Regular publication of China's customs statistics has resumed in China in 1981 after a 20-year break. In 1990 the Customs report was renamed 'China's Customs Statistics Yearbook'. The most essential conceptual shift in custom's statistics has happened in 1992, when China switched from the Standard International Trade Classification (SITC) to the Harmonized Commodity Description and Coding System (HS), recommended by the Customs Cooperation Council. According to the HS tariff codes for the individual commodities were changed from 5 or 6 digits to a standard 8-digit format. There were also less significant adjustments since the major introduction of the new statistical coding. As the result 10 basic statistical codes for bamboo products are reflected in the 'China's Custom Statistics Yearbook'. Unfortunately bamboo furniture has for unknown reasons disappeared from the coding. Also, a series of new and rapidly growing bamboo commodities, such as flooring, plybamboo and bamboo boards, were not recognized in the basic codes (Table 5).

Custom's statistics clearly shows four major periods of the Chinese bamboo trade activities (Table 6). During the first period, between 1981 and 1985, the total value of bamboo and rattan export did not indicate any trend and fluctuated in a corridor from US\$ 80 to 100 million. During the second period between, 1986 and 1995, total bamboo export grew dramatically, while rattan export stabilized. By 1995 total bamboo export had increased from US\$ 47 million in 1985 to US\$ 369 million. It

was the so-called 'golden era' of Chinese bamboo sector when production expanded by 21.5% every year. The third period, from 1996 to the beginning of 2000, was characterized by the Asian Crises. During this period bamboo and rattan export declined dramatically. Bamboo export dropped from US\$ 369 to 250 million in 1999, with an average annual rate of minus 9.5%. The fourth period started in the year 2000. Due to recovery of the Asian economy Chinese export again shows a vigorous positive trend to the promising US\$ 300 million level in 2000.

There is not so much to say about bamboo and rattan import, which remains at a marginally low level of 7.5% of the export value. It means that the bamboo and

**Table 5.**

Changes in statistical codes for bamboo product trade since 1981

Item	1981–1991	1992–1996	1997–present
Fresh bamboo shoots	54594	07099010	07099010
Salted water bamboo shoots	54622	07119020	07119031
Dried bamboo shoots	5615	07129010	07129010
Canned bamboo shoots	n.a.s.i.	20059030	n.a.s.i.
Whose with volume exceeding 8 liters	n.a.s.i.	n.a.s.i.	20059031
Other canned bamboo shoots	n.a.s.i.	n.a.s.i.	20059039
Bamboo materials	29235	14011000	14011000
Bamboo plaiting products	899711	46021030	46021030
Furniture made of rattan, bamboo & similar materials	n.a.s.i.	94038010	94038010
Bamboo furniture	821933	n.a.s.i.	n.a.s.i.
Wood & bamboo carvings	635492	44201010	44201010
Seats made of rattan, bamboo & similar materials	n.a.s.i.	94015000	94015000

Sources: [6, 7]. Note: 'n.a.s.i.' stands for 'not available as a separate item'.

**Table 6.**

China's export of bamboo and rattan products 1981–2000 (US\$ million)

Item and code	1981	1985	1990	1995	2000
Fresh bamboo shoots 054594	0.57	0.88	2.22	8.19	5.05
Salted water bamboo shoots 054622	1.51	2.56	8.65	4.74	5.72
Dried bamboo shoots 05615	1.25	0.67	4.08	8.17	9.07
Canned bamboo shoots 20059030				142.30	137.15
Bamboo materials 29232	6.40	7.99	14.82	34.73	22.98
Bamboo plaiting products 899711	52.99	33.82	99.62	164.30	119.00
Bamboo carvings		0.11	0.25	1.08	0.30
Bamboo furniture 821993	0.50	0.06	0.28	0.35	0.28
Bamboo fans		0.61	1.37	1.71	1.20
Bamboo combs		0.69	0.72	3.81	1.12
Export value of all bamboo products	63.22	47.39	132.00	369.37	301.96
Export value of all rattan products	46.15	33.56	40.14	93.92	58.27
Total export value of bamboo and rattan products	109.37	80.95	172.14	463.29	360.23

Source: [8].

rattan sector successfully contributes to the general positive trade balance of the country (Table 7).

### *Bamboo and rattan export distribution*

Table 8 presents statistics of bamboo export destination. Data in 1995 cover fresh bamboo shoots, salted water bamboo shoots, dried bamboo shoots, canned bamboo shoots, bamboo materials, plaiting products and exclude bamboo furniture. New products like flooring, plybamboo, paper, etc., are also not represented.

Japan has the biggest share in Chinese bamboo export. Since 1981 the share of Japan has increased from 7% to 55% in 2000. The share of Hong Kong has dropped from 45% to 5% for the same period of time. The dramatic shift has occurred due to the big Japanese investments, especially in canned bamboo shoots production in Zhejiang Province. Because of the direct Japanese capital investments in mainland China, Hong Kong has lost its role and benefits of a 'middle man' between the mainland China and the rest of the world.

**Table 7.**

China's import of bamboo and rattan products 1981–1998 (US\$ million)

Item	1981	1985	1990	1995	2000
Import value of all bamboo products	0.007	0.005	0.080	3.210	4.560
Import value of all rattan products	0.011	0.111	0.219	20.834	22.464
Import value of b&r products	0.018	0.116	0.299	24.044	27.024

Sources: [7–9].

**Table 8.**

Distribution of China's bamboo export (US\$ million)

Country	1995		2000	
	Value	%	Value	%
Japan	192.23	53.04	163.32	54.94
USA	34.82	9.61	32.97	11.09
Hong Kong	34.27	9.46	15.16	5.11
UK	21.82	6.02	8.81	2.97
South Korea	9.44	2.60	5.94	2.00
Netherlands	8.97	2.48	5.24	1.76
Germany	7.70	2.12	5.08	1.71
France	7.68	2.12	4.76	1.6
Taiwan	6.95	1.92	3.81	1.28
Italy	6.41	1.77	3.48	1.17
Others	32.14	8.86	48.57	16.37
Total	362.42	100.00	297.29	100

Source: [8, 10].

## COMPARISON OF COMTRADE DATA WITH THE NATIONAL CHINESE STATISTICS

In 2002 the International Network for Bamboo and Rattan (INBAR) has launched a new interactive and searchable database on international trade of bamboo and rattan on the INBAR homepage. The database is a direct product of cooperation between INBAR, Food and Agricultural Organization (FAO), International Tropical Timber Organization (ITTO) and European Forest Institute (EFI). It is based on COMTRADE data of the UN Statistical Division.

COMTRADE database follows the Standard International Trade Classification (SITC) and the Harmonized System (HS). The SITC system was developed by the United Nations to facilitate international comparison of trade data. The Harmonized System is a 6-digit commodity classifier developed in late 1980s by the Customs Cooperation Council, recently renamed as the World Customs Organization. Individual countries may extend the 6-digit code to 10 digits for custom purposes and to 8 digits for export purposes [11, 12].

The new INBAR database can be searched for products, years, countries and regions. Table 9 below represents aggregates of the database.

It should be noted that the aggregates in the database both overestimate and underestimate the total trade of bamboo and rattan. Overestimation stems from the fact that the represented aggregates may imply besides bamboo and rattan also willow, osier and other similar materials. On the other hand, the established database essentially underestimates trade volumes because it does not consider many new bamboo and rattan products, which have no specific HS 6-digit codes,

**Table 9.**

Bamboo and rattan export and import COMTRADE data, 2000 (US\$ 1000)

Commodity	HS code	Export	Import
Raw materials		128 547	179 399
Bamboo	140110	39 602	59 590
Rattan	140120	49 548	75 923
Veg. plaiting materials	140190	39 397	43 886
Products		2 417 839	2 740 750
Plaits and products	460110	17 777	13 909
Mats and screens	460120	219 404	170 210
Plaited materials not mats	460191	29 933	122 545
Basketwork	460210	713 799	932 795
Seats of cane, osier	940150	371 366	423 166
Furniture of cane	940380	1 065 560	1 078 125
Vegetables (shoots)		2 541 748	2 490 194
Vegetables incl. shoots	070990	1 156 968	1 112 536
Vegetables fresh or chilled	071190	259 281	293 681
Vegetables mixed	200590	1 125 799	1 083 977
Total		5 088 134	5 410 343

Source: INBAR online database [13].

such as bamboo pulp, paper, flooring, roofing, panels, boards, composite materials, charcoal, etc. A recent study by INBAR in China shows that HS codes identify only one-third of the China's total bamboo and rattan international trade.

Considering both types of mistakes, experts evaluate that total bamboo and rattan annual trade is about US\$ 5–7 billion. The estimates are comparable with the trade value of such commodities as banana — (US\$ 5 billion), cotton — (US\$ 6 billion), wheat — (US\$ 13 billion) and tropical timber — (US\$ 14 billion). The latter includes US\$ 6 billion trade of secondary processed products with an essential B&R component.

INBAR is to further develop its database. FAO/INBAR Expert consultations held at FAO Headquarters in Rome in 2000 and 2002 to review the status and develop strategy for improving B&R statistics. Experts from FAO, INBAR, WCO, COMTRADE, EU, National Customs and other governmental and non-governmental national and international organizations reviewed proposal to the WCO to introduce more bamboo and rattan codes to the HS [14, 15].

In September 2003 the World Customs Organization has approved the INBAR/FAO proposal recommended by the INBAR Council and supported by Chinese Customs and other national Customs Offices representatives to introduce new 6-digit customs codes for a number of expanding commodities including bamboo shoots, flooring, boards, furniture, charcoal, panels, pulp and paper. The new codes will significantly improve and facilitate bamboo and rattan statistics and trade.

## CONCLUSIONS

Bamboo and rattan statistics for the last 20 years shows significant shift of the bamboo and rattan agenda from low-tech use to sophisticated and high value added industrial applications. COMTRADE data show bamboo, rattan and other minority materials export-import value of about 180 million USD per a year. However more detailed countries studies, first of all Chinese study, show that COMTRADE six digital codes only recognizes insignificant part of the bamboo trade. More precise search needs knowledge and understanding of the national suffixes of the bamboo and rattan commodities. Simultaneous efforts should still be made at the international level to synchronize the national efforts to developing the extension codes for the national and international trade statistics.

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