



REVIVING TROPICAL PLYWOOD

How increasing transparency and cooperation in the tropical hardwood plywood trade could reduce market fluctuations and price volatility and reinvigorate the trade

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INTERNATIONAL TROPICAL TIMBER ORGANIZATION

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Lamon Rutten and Tan Seng Hock

ITTO Technical Series No 20

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The International Tropical Timber Organization (ITTO) is an intergovernmental organization promoting the conservation and sustainable management, use and trade of tropical forest resources. It has 59 member governments, which collectively represent more than 75% of the world's tropical forests and about 90% of the global tropical timber trade. Development projects in member countries are one important mode of operation; the Organization has funded more than 700 projects, pre-projects and activities at a total value of more than US\$258 million. At any one time it employs, through its project program, more than 500 field staff in the tropics.

ITTO has developed a series of internationally agreed policy documents for achieving sustainable forest management and forest conservation and assists tropical member countries to adapt these to local circumstances and to implement them in the field. ITTO also collects, analyses and disseminates data on the production and trade of tropical timber and funds a range of projects aimed at developing value-added industries at both the community and industrial scales.

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Foreword

The Asian currency crisis in 1997–98 marked a turning point for the international trade in tropical plywood. In the five years prior to 1997, 2.7-mm Indonesian plywood, the largest category of tropical plywood in international markets, was fetching around US\$700/m³ and, in one short period, reached as high as US\$780/m³. In 1997, though, the impact of the currency crisis in Asia caused prices to plummet to as low as US\$250/m³, in the vicinity of which they continued to languish for some considerable time.

The value of international trade in tropical plywood is estimated at US\$6 billion a year, more than twice the size of the global market for tropical logs. Given the size of this trade, the massive decline in plywood prices – coupled with increasing competition from other wood-based (and non-wood-based) panel products – has had a major impact on many ITTO producer member countries. Companies have collapsed, workers have been laid off and foreign earnings have shrunk. Nor has the resource itself benefited: lower prices undermine efforts to achieve sustainable forest management, at least partly because less money is available for forest management.

ITTO is dedicated to the conservation and sustainable management, use and trade of tropical forest resources. Major fluctuations in the price of tropical timber, therefore, are of concern to it because they affect the development of the trade and have a negative impact on the resource. Recognizing the seriousness of the situation, ITTO commissioned an analysis of the sector in 2002. That analysis, which was presented to the International Tropical Timber Council – the Organization's governing body – in 2003, forms the basis of this report.

It is a must-read for plywood manufacturers, traders and international trade policy-makers. It shows that price volatility and inadequate price discovery mechanisms are major handicaps in the international trade of tropical plywood, thereby pointing the way to a potential lifeline for the industry. It concludes that there is no magic bullet, no simple solution to problems in the sector. Rather, the report outlines a set of measures and practices that should strengthen the industry and help it to face its challenges. Some actions can be implemented by individual companies and others via cooperation between companies through associations at the country level; others may need an expansion of ITTO's activities.

The two authors, Tan Seng Hock of Samling Corporation in Malaysia and Lamon Rutten of the United Nations Conference on Trade and Development (UNCTAD), bring considerable experience to this study. Mr Tan has been marketing tropical plywood for many years, while Mr Rutten has spent most of his professional life in trade analysis and previously produced a report for UNCTAD on the plywood futures market.

The tropical plywood sector remains in a fragile state. It is ITTO's hope that this report will help to catalyse the action that is needed by all players if the sector is to flourish once more.

Manoel Sobral Filho

Executive Director

International Tropical Timber Organization

Acronyms

ABIMCI	Brazilian Association of Mechanically Processed Timber	FOB	Free on board
APA	Engineered Wood Association	FOEX	Finnish Options Exchange
APKINDO	Indonesian Wood Panel Association	GSP	Generalized System of Preferences
APPF	ASEAN Panel Products Federation	ITTO	International Tropical Timber Organization
ASEAN	Association of Southeast Asian Nations	JAS	Japan Agricultural Standard
B2B	Business-to-business	JIS	Japanese Industrial Standard
BB/CC	British Plywood Veneer Standard	JPIC	Japan Plywood Inspection Corporation
BDMC	Guangdong (General Chamber) Building and Decorative Material Chamber	MDF	Medium-density fibreboard
CBOT	Chicago Board of Trade	OSB	Oriented strandboard
CIF	Cost, insurance and freight	SFA	State Forest Authority (China)
CME	Chicago Mercantile Exchange	SFE	Shanghai Futures Exchange
CNF	Cost and freight	SHCE	Shanghai Commodities Exchange
COFI	Council of Forest Industries, Canada	TAG	Trade Advisory Group
FAO	Food and Agriculture Organization of the United Nations	UN/ECE	United Nations/Economic Commission for Europe
FIAO	Forest Industry Administration Office (China)	UNCTAD	United Nations Conference on Trade and Development
		USDA	US Department of Agriculture
		WTO	World Trade Organization

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Executive summary

The tropical plywood sector is under strong threat from other plywood and wood-based panels. Total world plywood production increased by 19% between 1991 and 2001 and total production of wood-based panels by 50%, but tropical plywood production fell in this period. Problems with log supply certainly played a role in this, but it is likely that demand-side factors, including issues related to tropical plywood market transparency and price risks (*vis-à-vis* the situation for other wood-based panels), also played a role.

The International Tropical Timber Organization (ITTO) aims, *inter alia*, “to improve market intelligence with a view to ensuring greater transparency in the international timber market” and “to encourage information sharing on the international timber market”. This report seeks to help meet these objectives by identifying measures to bring increased transparency to the tropical hardwood plywood trade and by analysing the causes of market fluctuations and price volatility.

Problems with lack of transparency in the plywood market

The tropical plywood market is not as transparent or predictable as markets for other wood-based panels. There is a lack of transparency both in respect to ‘macro’ factors, such as the situation and developments in major producer and consumer countries, and in respect to the day-to-day functioning of the tropical plywood market.

The tropical plywood industry is going through major changes in many of the major producer and consumer countries. The plywood sectors in Brazil, China, Indonesia and Japan have all seen major upheavals in recent years and in China and Indonesia the situation has not yet stabilized. The industry is in search of a new equilibrium. This would not be a problem were it not for the fact that tropical plywood has viable substitutes. If, to reach the new equilibrium, markets are disrupted, some risk-averse end-users (and most are likely to be risk-averse) may decide to shift to alternatives or substitutes.

In the past few years, Brazil has moved from being a tropical plywood producer and exporter to being an exporter of primarily plantation softwood plywood; many of its older tropical plywood mills have not

survived. Japan has also seen many of its plywood mills close down and difficulties in procuring logs are causing many of the remaining ones to look for temperate hardwood logs and softwood logs as inputs. Naturally, these mills (with support from the plywood associations of Australia/New Zealand, Canada and the United States) are actively developing the markets for these plywoods to the detriment of tropical plywood. In Indonesia, the influence of the Indonesian Wood Panel Association (APKINDO) over both the international market and the domestic producers has been broken and this has had a number of effects. One is that there is no longer a price leader in the tropical plywood industry; another is that statistics on Indonesia’s plywood industry have become much less reliable; yet another is that the behaviour of Indonesian exporters on world markets has become unpredictable and, at times, unreliable. Indonesian government forest policies are far from clear even to Indonesian market players – among other things, it is not clear whether national or provincial authorities control forestry policy. Indonesia’s share of the international plywood market has fallen by almost half in the past eight years and is likely to decline further due to problems in log supply and the difficult cash-flow situation of many plywood mills. Indeed, a significant new player in the plywood market, China, has reportedly been able to compete with Indonesian producers even in the Indonesian domestic marketplace.

Developments in China’s plywood sector have been the most dramatic of all and have clearly not yet played out fully. China’s production and consumption of plywood have been rising for years. Not long ago China was a major plywood importer but it has now become the world’s third-largest tropical plywood producer, the second-largest consumer and the third-largest exporter: China’s plywood exports may soon overtake those of Malaysia. Contrary to the declines that characterize the plywood industries in many other countries, in China the industry is growing and is likely to continue its fast growth given the competitiveness of its prices in international markets. The unique nature of its plywood industry, which comprises a small number of medium-sized and large entities on the one hand and a large number of small/cottage industries on the other, makes it difficult for the Chinese industry to become organized. There is also a lack of timely information on the industry.

This is a problem not just for foreign observers but also for the Chinese industry itself. Exports come from each of the industry groups and competition is savage. Moreover, Chinese producers have started what may become a new trend in the tropical plywood industry, namely combining relatively cheap poplar, a fast-growing temperate hardwood species, as core material with tropical hardwood veneers as the face and back for plywood. This 'combi' plywood could conceivably become a new standard for certain plywood end-uses, with 'pure' tropical plywood losing any price premium that it still may have.

In the international marketplace, these developments and changes in trading practices have increased the role played by international traders, in particular for Chinese and Indonesian plywood, to the detriment of direct relations between producers and importers. For example, industry consolidation has been fast in a country like Japan, where volatile markets and declining margins have led importers, wholesalers and distributors to merge operations and to bypass one or the other part of the marketing chain.

All these changes create uncertainty for the managers of tropical plywood mills, who must make strategic decisions. How should they place their mill's production on a market faced with so many uncertainties?

Meanwhile, producers of temperate hardwood and softwood plywood and other wood-based panels are moving decisively ahead, often through their associations, to promote their products. They do so not just with conventional publicity but also by working with regulatory authorities in major consumer countries (including China and Japan). This cooperation enables them to ensure that their panels meet new, stricter regulatory requirements and, moreover, gives them a say in the development of new building standards that allow more of their products to be used.

In addition to these strategic uncertainties, tropical plywood mills are faced with significant day-to-day uncertainties. Tropical plywood prices are volatile. Most other markets that have high price volatility have futures markets where operators can lay off their price risks. Such a market doesn't exist for plywood; the plywood futures contract traded on the Shanghai Commodities Exchange was delisted in 1997 and has not been revived. The tropical hardwood plywood trade and industry now rely on a wide range of informal and formal information

sources, none of which is complete or necessarily fully reliable. In many instances, even if producers and others have reasonable information on the conditions in their particular region they are often poorly informed about conditions and developments in the rest of their country, let alone in the international marketplace. The information that is available, including on prices, is prone to distortion.

In addition to making daily decisions on sales more difficult, price uncertainty seriously hinders short-term planning. While at first sight some of the price fluctuations may seem small, plywood mills are vulnerable: they operate on low profit margins, are often forced by the shortage of logs to produce much below full capacity, and are often under pressure from rising log prices and relatively low plywood prices.

The seriousness of price volatility is even more apparent when one considers price changes over a six-month period. This is still a fairly small period from the perspective of a plywood producer because it is difficult for him to really change his cost structures in such a short time. In two out of three cases, the price of plywood in a given month is more than 10% different from that of six months earlier and in one out of three cases the difference is more than 20%. This situation leaves producers, traders, end-users and others highly vulnerable, and carrying a large inventory can become a costly mistake. Entering into a forward contract may help the logistics of a buyer or seller, but it is too risky because either of the parties may walk away from the deal if market prices move in his favour.

It is also worth noting that tropical plywood price volatility (and thus unpredictability) is much larger than that for other substitute wood panels. For example, oriented strandboard (OSB) prices have been shown to move more than 10% over a six-month timeframe in 21% of cases analysed, compared to 70% of cases for tropical hardwood plywood. Softwood plywood prices show similar relative stability. It is clear that the stability of OSB and softwood plywood prices greatly facilitates the budgeting and planning of, for example, construction companies. Thus, it is not surprising that many end-users have shifted to the use of softwood plywood and substitutes such as OSB, often encouraged by importers who not only find the supply of these alternatives more reliable but also, in a number of cases, have invested in their production.

Tropical plywood producers have tried to adapt their operations to the volatile market environment but these adaptations, in turn, have created their own problems. Short-term sales are prevalent in the sector. Most plywood is sold one or two months forward and sales are hardly ever for periods beyond three months forward. This hinders the capacity of mills to plan their production: that is, to determine which types of logs they need, to procure these logs in time and at an acceptable price, and to organize the logistics of production and transport to ensure on-time product delivery. In the responses to a questionnaire distributed by the authors, the ability to better plan forward sales was most often mentioned as the major consequence of introducing a tool for producers to manage their price risk. Further, the use of letters of credit as the common payment method in the international plywood trade, despite its relatively high cost, is indicative of a situation in which one has a serious risk of order cancellation or payment default.

Recommendations

The tropical plywood industry has to find ways to confront the dual challenges of decreasing supplies of logs and increased competition from softwood and temperate hardwood plywood and from other wood-based panels. The lack of transparency and the difficulty of managing high market volatility and price risks are not the only problems for the tropical plywood sector. But these are important problems and it would be a mistake to focus on, say, the problem of the sustainability of log supply and to leave the problems of transparency and price volatility for later. Tropical plywood has already seen its market share decline precipitously and this decline is likely to continue unless the industry formulates a coordinated response. There is no magic bullet, no simple solution to the tropical plywood industry's problems. Rather, there is a set of measures and practices that could strengthen the industry and help it face these challenges. Some of the recommendations given here can be implemented by individual companies or by cooperating companies at the country level, and others suggest an expansion of ITTO's activities. Even where recommendations are not targeted directly at ITTO, the Organization could play a major role in making the tropical plywood industry more aware of the nature and extent of the challenges it faces and helping to design responses to these challenges.

At the most basic level, the tropical plywood trade and industry stand to benefit from measures that would allow for better information flows. This would enable all market participants, producers as well as consumers, to respond more predictably and appropriately to changing supply and demand conditions, which in turn would improve the stability of the tropical plywood market. A more stable tropical plywood market would be more attractive to consumers and would thus help tropical plywood producers to better resist the continuing pressures from temperate hardwood and softwood plywood and other wood-based panels. Information-sharing should start at the national level.

Producers of softwood and temperate plywood panels are well organized and engage in an active promotion of their sector; the tropical plywood industry is not active in this way and has been unable to coordinate a response. It needs lobby and promotional organizations similar to those created and sustained by rivals; only through such cooperation and public-awareness measures will tropical plywood industry be able to 'sell' itself in the face of not just environmental concerns but also active efforts from softwood plywood producers to push their products.

Better and more organized information-sharing by producer and consumer countries at the national level will provide the foundation for market transparency in each of the countries' plywood sectors. This in turn will lay the foundation for improving market transparency at the international level through bilateral and multilateral cooperation among the tropical hardwood member countries of ITTO. ITTO is the central organization for the world's tropical hardwood industry, including the tropical hardwood plywood sector. No other international body has such a wide range of activities in support of the industry, from price information to the reporting of statistical data and the analysis of industry trends. Unlike the situation for many other commodities, there are no international private-sector bodies (eg an international industry association) or other entities (eg a specialised press) able to take on the roles currently fulfilled by ITTO. It is thus likely that ITTO will have a central role to play as a forum, or at least the catalyst, for national efforts to improve industry interaction.

One could envisage the following roles for ITTO in the area of improving market transparency:

- support national-level efforts towards organization. Through support to national organizations, ITTO could promote the creation of a global plywood association that could include the plywood industry from its producer members as well as the large producers among its consumer members (particularly Japan and China);
- organize the exchange of information among private-sector operations. ITTO can act as a catalyst for improving communication between private-sector players and help improve the private sector's understanding of worldwide trends. The creation of the Trade Advisory Group by ITTO was a commendable initiative. Its role could be further expanded to address the economic issues directly affecting the industry;
- improve its own data-gathering and dissemination operations: by including key non-member countries, for example;
- set up a price information network. Many other commodity industries have an efficient price information system, either centred around a futures exchange or around an organized system for gathering and distributing real price data (often done by specialized industry publications). With such a system, the benefits of knowing price levels may be enough of an incentive for companies to overcome the fear of sharing some of their own 'confidential' information. In the absence of a worldwide private-sector plywood publication that gathers price information or a futures exchange, ITTO could design a mechanism to gather better price information; and
- stimulate the emergence of plywood-specific websites for the support of the sector.

With respect to measures for dealing with market fluctuations and price volatility, tropical plywood mills have a number of individual measures at their disposal. By moving into specialized, 'non-commodity' types of plywood, or moving further up the marketing chain (by producing more sophisticated products, or by bypassing the middlemen), the producer can not only retain a larger part of the plywood value-added but also reduce his exposure to market volatility.

However, whether changing the range of end-products makes sense for producers depends on their particular conditions. In some cases (eg laminating plywood), they may be too far from consumer markets. The ready availability of inputs may also create economic constraints on value-added production. Further, all value-added products have relatively limited markets. Nevertheless, even if most large plywood producers will, for a long time, sell most of their plywood in a 'raw' form, for the industry as a whole as well as for individual plants it makes sense to explore viable ways of moving up the value-added chain. Four issues may merit consideration:

- research into new uses of plywood can be successful. In cooperation with other industry bodies, ITTO may wish to develop proposals for possible funding by the Common Fund for Commodities;
- producers may wish to explore how they can enter into supply-chain alliances with importers and wholesalers. Under such arrangements, a producer can, for example, pre-position a range of plywood in a warehouse in the importing country, from which deliveries can be made;
- like other products, plywood can be branded. Although the resulting price premium will be small, demand for brand-name plywood will be somewhat more price-inelastic than that for 'nameless' plywood; and
- internet-based business-to-business (B2B) exchanges can be a tool to shorten the supply chain, bringing producers and consumers into direct contact. B2B exchanges in the plywood sector are still in a rather underdeveloped state, but if they develop clearinghouse mechanisms (which enable buyers and sellers to eliminate the counterpart risks that normally would come with trading with new and unknown parties) their importance could increase.

Perhaps the most ambitious and far-reaching effort to improve the transparency of the international tropical plywood industry and to provide the industry with the tools that it needs to deal with market fluctuations and price volatility, would be the introduction of an international tropical plywood futures market.

A futures market is a good barometer for the underlying physical plywood market. The prices at which the nearest futures contract trades would, at most times, reflect the actual supply and demand situation in the physical plywood market, or, to be more accurate, the market where the exchange's delivery points are located. If these delivery points were sufficiently representative of the wider national or international market, futures prices would then be representative of these wider markets as well.

A futures market can also be used to manage (hedge) price risk. Plywood manufacturers regularly hedge their income or payment flows when it comes to exchange rates. They also insure their factories, people and other assets against all sorts of accidents and uncertainty. Unfortunately for most of them, there is no insurance market for them to cover themselves against the biggest and most common risk, which is the risk of their product price falling suddenly lower than budgeted or raw materials suddenly costing much more than projected. The lack of any such insurance cover means that the plywood mills are unwittingly assuming a speculative risk on the direction of their product and raw material prices.

A futures market has the advantage over a simple price reporting system in that it leads to 'immediate' price discovery (a price information system gives

price levels only at the end of the day, or the next day). Such a futures contract could be traded through an electronic format or through an old-fashioned exchange.

China would seem a good choice for the location of such a mechanism given its growth in tropical plywood consumption, production and export. Indeed, plywood futures were once traded on one of the predecessor exchanges to the Shanghai Futures Exchange (SFE). Reintroducing a plywood futures contract in Shanghai would provide strong support to the orderly growth of the domestic plywood sector. It would provide China's plywood sector with an invaluable tool for price discovery and price risk management. Plywood companies from other Asian countries would undoubtedly also wish to use the exchange, if Chinese regulations allow them. In the current period after China's accession to the World Trade Organization, this could perhaps be one concrete expression of China taking a more prominent role in the world economy. Given the benefits for the tropical plywood industry of having a price reference and risk management tool, ITTO may consider providing assistance to the SFE in its interactions with the plywood industry. If the SFE seriously considers the reintroduction of a plywood futures contract, ITTO could give it a forum at one of its regular meetings.

1 Introduction

This study to identify measures to bring increased transparency to tropical hardwood plywood trade and analyse the causes of market fluctuations and price volatility is designed to contribute to the achievement of several ITTO objectives, including:

- Objective (a): “to provide an effective framework for consultation, international cooperation and policy development among all members with regard to all relevant aspects of the world timber economy”;
- Objective (h): “to improve market intelligence with a view to ensuring greater transparency in the international timber market, including the gathering, compilation and dissemination of trade-related data, including data related to species being traded,” and
- Objective (n): “to encourage information sharing on the international timber market”.

The study is also directly related to the two goals set out in the ITTO Yokohama Action Plan for the field of economic information and market intelligence, which are to improve the transparency of the international timber market (particularly actions 2, 3 and 4) and to promote tropical timber from sustainably managed sources (particularly actions 2 and 6).

The overall objective of this study is to explore how to improve market intelligence and transparency in the international tropical hardwood plywood trade. While total world plywood production increased by 19% between 1991 and 2001 and total production of wood-based panels by 50%, tropical plywood production fell in this period by more 16%. Problems with log supply played a role in this, but demand-side factors, including the collapse of the Japanese housing market in 1997 and issues related to tropical plywood market transparency and price risks (as compared to the situation for other wood-based panels), also contributed. This study explores possible measures that could increase transparency in the international hardwood plywood trade and help to manage risks associated with market fluctuations; it makes several recommendations in this regard.

The terms of reference for the study are:

- to assess the size, volume and value of the global panel products market, in particular the tropical hardwood plywood trade and the future outlook for the market;
- to analyze, assess and discuss the underlying causes of market fluctuations and price volatility in the tropical hardwood plywood trade;
- to assess and analyse the present situation of the tropical hardwood plywood trade in relation to market transparency and market risk associated with changes in supply and demand, and price volatility;
- to investigate, explore and recommend a course of action to assist in enhancing market transparency and managing risks associated with fluctuations in the market; and
- to prepare and present a report for the consideration of the Committee at the Thirty-fourth Session of the International Tropical Timber Council (May 2003).

Market transparency, or rather the lack thereof, is both an operational and a strategic issue for plywood producers. Since the Indonesian Wood Panel Association (APKINDO) abandoned its price leadership role, the price discovery system in the international market of tropical hardwood plywood has become a guessing game, leaving market operators with difficulties in negotiating prices. But beyond that, strategic decision-making is now more complicated because of a lack of information on what is happening in the sector. This is partly the result of major uncertainties in the industry in certain countries and partly the result of gaps in the organized collection and dissemination of information. The tropical hardwood plywood industry in Indonesia, China and Japan are expected to undergo further structural changes in the years to come that will affect price levels, price transparency and price volatility, making it even more difficult for producers and consumers to plan for the future. ITTO's decision to work in this area is therefore most timely and appropriate, reflecting the proactive and relevant role of ITTO in working to enhance global timber market transparency.

The tropical hardwood plywood trade and industry now rely on a wide range of information sources, from informal to formal; none of these sources is complete or necessarily fully reliable. In many instances, even if producers and others have reasonable information on the conditions in their particular region, they are often poorly informed about conditions and developments in their country, let alone in the international marketplace. Such information as is available, including on prices, is prone to distortion.

The tropical plywood trade and industry, therefore, stand to benefit from measures that would allow better information flows, as this would enable all market participants, producers as well as consumers, to respond more predictably and appropriately to changing supply and demand conditions. This, in turn, would improve the stability of the tropical plywood market. A more stable tropical plywood market would be more attractive to consumers and would thus help tropical plywood producers to better resist the continuing pressures from softwood plywood and other wood-based panels (whose markets are much more stable than those of tropical plywood).

This report canvasses industry structures and practices in major producer and consumer countries (Brazil, China, Indonesia, Japan, Malaysia and the USA) (Chapter 2) and discusses the primary causes of market fluctuations (Chapter 3). The implications of the lack of transparency of the market are elaborated in Chapter 4, and Chapter 5 provides recommendations to enhance market transparency. Annex 1 gives an overview of the international tropical hardwood plywood market – production, main trade flows, and general developments affecting the future outlook of the market. Annex 2 describes internet sources of market-relevant information for the tropical plywood industry.

In preparing the report the authors distributed a questionnaire to plywood producers and visited China, Indonesia, Japan and Malaysia, interviewing a range of people in the plywood industry, including government officials, panel association leaders, marketing officials of large and small producer mills, and purchasing managers for end-users. They also met with distributors, traders, importers and plywood buying agents and communicated with market players in Brazil, Singapore and the UK.

2

2 Industry structures and practices in major producer and consumer countries

Tropical plywood is part of the wood-based panels sector. In 2001, total world production of wood-based panels was 174.2 million m³, of which plywood accounted for 32%. Tropical plywood, in turn, accounted for some 35% of total plywood production. Tropical plywood production has fallen in absolute terms over the last ten years (by more than 16% in ITTO member countries), not only because of problems with log supply, but also because of competition from other wood-based panels.

ITTO divides its members into tropical timber producing and consuming countries – a division that is followed in the discussion below. Indonesia dominates tropical plywood production, with 37% of world production in 2001 (down from 42% in 1992), followed by Malaysia with 21%. China, which is a consumer in ITTO's classification, accounted for 18% of world tropical plywood production in 2001 and, at the rate at which its production is growing, will soon overtake Malaysia as the second-largest producer. Brazil is the fourth-largest producer, with 7% of world production. Japan, another consumer in the ITTO classification, has seen its share of world production decline from 23% in 1992 to 6% in 2001. Other traditionally large producers which have seen their production fall strongly in the last decade are the Republic of Korea and Taiwan Province of China, which now account for 2% and 3% of world production respectively. Tropical plywood is produced in many other countries throughout the world, both for the local market and for exports. The five major producers and the three major consumers (a total of six countries, as China and Japan are both major producers and consumers) will be discussed in some detail below.

The tropical plywood industry is concentrated in Southeast and East Asia, which account for more than 85% of world production. China has the largest number of mills, but Indonesia dominates in terms of total production capacity. The capacities of the mills range from very small (one line) to very large (more than 100 lines – the capacity of a line is about 2,000 m³ per month). While some groups own several mills, no company really dominates the market.

Competition among tropical plywood producers is strong and the sector is also exposed to competitive pressures from softwood plywood and from other wood-based panels.

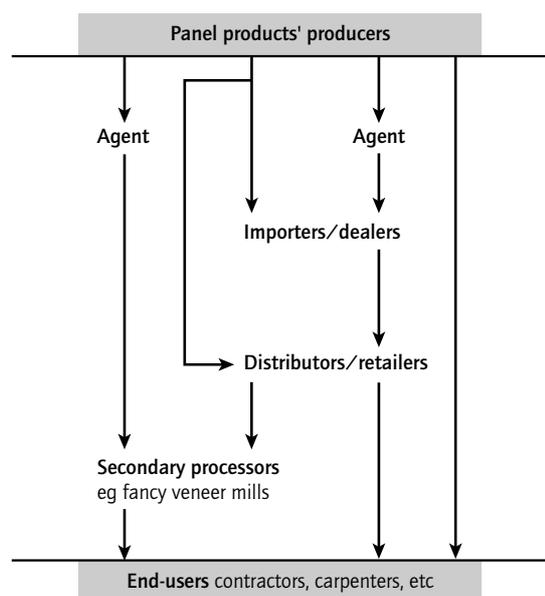
International trade structures and practices

Figure 1 gives a schematic overview of the international trade channels for wood-based panels. As can be seen, there are normally several layers between the producers of panel products and end-users; each part of the chain absorbs some of its value-added.

The agent acts on behalf of either seller or buyer and receives a commission for his work. Usually, the agent works for an importer or secondary processor. Agents deal with several different panel products' producers; they contact them when they have a buyer, and the 'winner' of the transaction will then be told who the buyer is.

Importers buy on a 'free on board' (FOB) or CNF (cost and freight) and CIF (cost, insurance and freight) basis on their own account; they take the credit risk of the producer. The producer will not know to whom an importer will sell the plywood. Most importers work on a back-to-back order/supply basis rather than keeping a sizeable inventory. As soon as they find a buyer or seller they will enter into a transaction. However, occasionally they will take a market view and build up a position.

Figure 1: *The international channels of trade*



The **distributors and retailers** hold stocks because, in general, their clients want immediate delivery. They buy either directly from the producer or from an importer and normally obtain credit terms from their supplier. This is indicative of their important market position, which is based, in part, on the fact that they have the best information on end-user demand. They can also provide credit to their clients.

Secondary processors buy plywood to produce value-added products. Good relations with the end-users are crucial for this segment – technical support and after-sales service is important for maintaining sales.

End-users tend not to own warehouses and thus cannot hold large stocks. They buy to meet their short-term needs, even if these needs are easily predictable (eg for a construction project). More than half of the demand for plywood is from the construction industry, but renovation, furniture production and joinery are also important.

The most common trade channels in international plywood trade are:

- direct contract sales to overseas customers, often through sales offices or agents: this is the common form of trade for sales to Europe;
- sales to traders, predominantly based in Singapore and Hong Kong Special Administrative Region of China; and
- sales to representatives of overseas companies who are buying directly at origin.

Although exact data are not available, sales to traders form a reasonably important market segment, accounting for a quarter of Malaysia's exports and perhaps an even greater part of Indonesia's exports. Before APKINDO lost its control over the sector, the share of traders in Indonesia's exports was less than 10%. Now their importance has grown as mills that previously had been selling through APKINDO's marketing network, which had sales offices in China, Japan and the Middle East, have had to find their own market outlets. Most Indonesian exporters sell to the Middle East through Singapore traders; sometimes they sell through Japanese trading houses for their sales to the USA and through traders based in Hong Kong Special Administrative Region for sales to mainland China. Several Japanese trading

houses now have buying offices in Indonesia, whereas previously they had bought from APKINDO's Nippindo office in Japan. Traders play an important role in mitigating credit risk and are often used when mills want to sell to relatively risky markets. At times they also fulfil an important storage function by buying stock from mills when mills have problems finding buyers, solving the storage problem, helping with cashflow and easing mills' financing capacity.

An important new trend in the market is that some end-users, such as large construction firms and large furniture manufacturers in Japan and Europe, are making an effort to bypass the traditional importing firms. This is being facilitated by large plywood mills 'pre-positioning' part of their stock in warehouses in the importing countries. This allows them to cut down delivery times and improve customer service.

Many of the trade links in the international plywood trade are longstanding. Mills generally have a reasonable idea of how much a certain buyer or agent will require in a certain month and they expect that the mill will be notified if the actual purchase will differ significantly from the order. Even though these are not written contracts they are very real and plywood mills will always make an effort to fulfil such obligations. The prices in these informal contracts are market-dependent and are converted into a fixed final price only at the moment when the actual sales contract is negotiated.

Forward contracting for short periods is common. At the very least, a mill will have contracted forward 80% of the following month's expected production, 60% of expected production for the month after that, and 40–50% for the subsequent month; some mills go further (up to six months) but most do not. Flexibility is retained because of the uncertainty of production (the plant may have technical problems, and sufficient logs of the right types need to be procured, since only certain types of log will do for the faces), not because it allows the mills to benefit from market opportunities. Prices in forward contracts are fixed, normally being negotiated on the basis of current prices. In rare cases, prices are left open and determined only at delivery time on the basis of the prices then prevailing. Buyers tend to buy on the basis of two-to-three-month forward contracts, although shorter-term purchases are becoming more common in the case of Japanese companies.

Producer countries

The major ITTO producer member countries that manufacture tropical hardwood plywood are Indonesia, Malaysia and Brazil; together they accounted for 63% of total production in ITTO member countries in 2001. India and the Philippines followed with world market shares of 1.6% and 1.3% respectively in 2001. Only three other producer countries – Gabon, Ghana and Ecuador – produced more than 100,000 m³ in 2001 out of a total world production of 19.5 million m³. ITTO consumer countries accounted for 30% of world tropical plywood production in 2001.

The two major producers, Indonesia and Malaysia, are both heavily export-oriented; in contrast, Brazil sells more than half its plywood on the domestic market. Of the other relatively important producers, Ecuador, India and the Philippines export less than 10% of their production, while plywood producers in Gabon and Ghana are export-oriented.

Indonesia

In 2002 Indonesia had 118 plywood mills (compared to 29 in 1980) with a total capacity of 10 million m³ per year. A few of these mills produce only fancy plywood, PVC-covered plywood and other specialized products, but most concentrate on producing the usual commercial plywood. However, according to APKINDO, only 70 companies were in operation in mid-2001; together, they had an annual production capacity of about 7 million m³. The US Department of Agriculture (USDA) expects Indonesian plywood production to be maintained at 7.7–7.8 million m³ in 2003 and 2004, despite a reduction in the annual allowable cut to 6.9 million m³ in 2003 (and of this total harvest, one-third is normally used by industries other than plywood).¹

Production figures from Indonesia should be interpreted with caution. With the changed role of APKINDO (see Chapter 1), reliable statistics are no longer gathered. Even the reported plywood production is greater than what can be produced with the officially recorded log production.

Many of the mills are concentrated in commercial groups, the largest of which is the Korindo Group, which reported plywood production of 800,000 m³

in 2001, followed by Barito Pacific Group, with concessions spanning 6 million hectares and a production of 600,000–700,000 m³.

Most plywood mills have their own concessions (ie the right to harvest natural forests) or estates; in fact, as a result of a 1985 law companies are required to set up processing mills in order to retain their timber concessions. While mills can procure a significant part of the logs they require from their own concessions they are facing growing difficulties as a result of a decline in log supplies as harvests are reduced.

The rapid growth of the Indonesian plywood industry increased pressure on forests, leading the government to declare the plywood industry closed to new investments and to introduce tighter controls on forest exploitation. It imposed restrictions on concession rights in January 1999 (allowing no group to have concessions of more than 400 000 hectares nation-wide) and followed this with several further restrictive measures (especially an ever more stringent maximum allowable cut). On the other hand, the Indonesian government has taken steps to stop the export of logs, which may help with domestic supplies.²

The trade complains that government forest policies are not stable and new policy initiatives are introduced regularly. The policies and decisions of various government departments are not necessarily always consistent.³ Under these conditions, it is difficult for the Indonesian government to enforce its policies.

² For this purpose, the Indonesian government has signed bilateral agreements with several importing countries (China, Malaysia, UK) meant to curb illegal logging. Sources in China reported that, indeed, this has led to a strong fall in log imports from Indonesia. The government has, however, so far not managed to enlist the active support of its own timber and plywood companies. It should be noted that on the importing side, eg in Malaysia, industry associations also have difficulty disciplining their member companies who use illegally imported logs.

³ Indonesia's Minister of Forestry recognized some of the problems in a 2003 speech, noting that there were different perceptions among the Ministry of Forestry, the Ministry of Industry and Trade, and the State Minister of State-Owned Enterprises through the Indonesian Bank Restructuring Agency, IBRA (the agency responsible for selling the assets that reverted to the State during the Asian crisis) on the issue of forest industries restructuring:

- the Ministry of Forestry's concern is to preserve forest resources;
- the Ministry of Industry and Trade's concern is to improve productivity and exports of forest products;
- IBRA's concern is to maximize debt recovery. IBRA has sold the assets of forest-industries debtors without considering that the industries do not have sustainable raw materials; and
- there is a different interpretation between central and local governments on responsibility for forest management.

(Remarks by the Minister of Forestry of the Republic of Indonesia, Muhammad Prakosa, at the 12th Consultative Group on Indonesia meeting, Denpasar, January 2003)

¹ USDA Foreign Agricultural Service, *Indonesia Solid Wood Products Annual 2003*, 7 February 2003.

For example, according to one estimate, illegally cut wood accounted for some 65% of supply to the plywood, pulp and paper industry in 2000.⁴ Policies are difficult to implement because the central government has delegated considerable authority to the provincial governments (not just in its forest policy, but in most domains of government policy and regulation). For example, the 1999 revised forestry law gives district heads the right to allocate 100-hectare logging licenses and hundreds have been granted in some areas.⁵ An order from the Minister of Forestry in October 2000 designed to stop this practice has had little effect. It is unclear what body is ultimately responsible for implementing central government regulations or even whether national regulations take priority over local ones.

In recent years, many plywood manufacturers have had to cease or reduce operations due to high production costs, a shortage of logs, stiff competition from other suppliers, an unpredictable policy setting and low world market prices. Production and supply by some mills is on a stop-go basis, driven by the fluctuations of their log supply, their cashflow availability, and needs. Moreover, weak economic conditions in importing countries (particularly Japan), coupled with the introduction of increasingly stringent quality requirements that Indonesian exporters may have difficulty meeting, have reduced demand for Indonesia's plywood in some of its traditional markets.

In response to the problems plaguing the sector, the industry has taken several steps to enhance competitiveness. These include efforts to utilize logs more efficiently, shifting to more value-added products, and developing new markets. For example, some mills have installed new equipment that can recover more veneer, thus reducing core waste. In addition, mills are focusing more on using the by-products of the plywood production process to make particleboard and/or other products. Mills are also beginning to examine importing supplies, particularly from New Zealand (pine) and Africa, in the light of domestic log shortages. Even with a 10–15% import duty and prices ranging from US\$70 to US\$125 per m³, industry representatives feel that using imported raw materials will be commercially

viable, particularly if efforts now underway to abolish the import duty are successful. Also, several large-scale plywood producers continue to import other species, including from North America (mostly oak, cherry and birch), to be used as the surface layer to make higher-valued fancy plywood.

APKINDO has seen its role much weakened in recent years and is in no position to impose on its members. In effect, its ability to coordinate the prices quoted by Indonesian mills for their exports has disappeared; nor is it able to gather reliable industry data, be they volumes produced and exported or prices. Given that Indonesia is still the major tropical plywood producer, this situation not only hurts the Indonesian plywood sector but also undermines the transparency and predictability of the world plywood market. Some mechanism that allows the Indonesian plywood sector to improve information flows would be highly beneficial. If APKINDO has been too much tainted by its past, there exists perhaps a role for an outside party that is internationally recognized in the tropical timber fraternity to act as an interim communication conduit so that the information flow that existed in the past can be re-activated.

Malaysia

Plywood production in Malaysia has grown steadily from about 1.8 million m³ in 1991 to close to 4 million m³ in 2002, but growth is expected to be slower in the future. There are traditionally two major sources of logs in Malaysia: logs produced from the clear-cutting of forest in order to prepare the land for other uses; and logs produced on a longer-term basis from the permanent forest estate. The availability of logs from both sources is declining. Fewer forests are being transformed into oil palm and rubber estate or cleared for urban development. Exploitation of the natural forest is now more regulated with a stricter eye to sustainable forest management. Forest plantations are still of relatively little importance in Malaysia, although their role is growing.

The larger part of Malaysia's plywood production, 62.5% in 2001, is in Sarawak; Sabah accounted for 22.4% in the same year and Peninsular Malaysia for 15.1%. While the plywood industries in Sarawak and Sabah are export-oriented, most of Peninsular Malaysia's production is for the local market (it accounts for less than 6% of exports). Sarawak has large-scale mills compared to the rest of the country: in 2000, there were 48 plywood and veneer mills in Peninsular Malaysia, 68 in Sabah and 53 in Sarawak.

⁴ Forest Watch Indonesia/Global Forest Watch, *The State of the Forest: Indonesia*, Bogor, Indonesia, 2002.

⁵ According to an investigative report by the news magazine *Tempo*, 24–30 July 2001.

Log supply will become an ever more crucial issue in the years to come. In Peninsular Malaysia, few of the mills, which are relatively small, have timber concessions. In Sabah, only the state-owned timber companies and two or three others have their own timber concessions. In contrast, many of the mills in Sarawak are associated with timber concessions.

But even those mills with access to their own concession purchase a large part of their log supply on the open market, primarily for reasons of logistics (timber land is not always optimally located in relation to the mill). Unlike Indonesia, Malaysia allows the export of logs; the prices that Malaysian plywood mills pay for logs are therefore directly linked to international prices – that is, they are subject to change depending on demand from China, Japan, India and the Republic of Korea.

As it becomes increasingly difficult to procure logs, mills that do not own their own concessions will find themselves in difficulties. It is expected that, in the years to come, many of these mills will go out of business, leaving plywood production mainly in the hands of companies with their own timber concessions.

The Malaysian government has stimulated development of the timber sector and has tried to reduce its vulnerability to the highly volatile 'primary' market for logs, sawn timber and plywood by encouraging moves into value-added products such as joinery and furniture. As Table 1 shows, this shift is taking place. Moving into the production of downstream products not only allows the country to capture a larger part of the value-added in the marketing chain, it also permits the industry to move out of the commodity plywood sector. The market for commodity plywood tends to be relatively more volatile compared to that for speciality plywoods. Nevertheless, while it may make sense for a country to move into value-added production, this may not necessarily be feasible for every plywood producer. A large-scale plywood manufacturer, set up to produce commodity panels, is not necessarily well suited to produce for the furniture market, for example.

Brazil

Brazil produces softwood as well as tropical hardwood plywood. Plywood is produced from plantations (the country has 5 million hectares of mature plantations, of which eucalypt and pine comprise 90%), from the hardwoods of the tropical Amazon forests, and from temperate hardwood and softwood forests in the eastern part of the country.

The plywood industry in Brazil started during the 1940s in the southern region using Parana pine logs from natural forest as the primary raw material. Production of tropical plywood using natural rainforest logs commenced only in the 1970s. The industry reoriented itself from tropical hardwood plywood to pine plywood in the second half of the 1990s; hardwood plywood production fell by 60% between 1995 and 2000 while pine plywood production increased by 85%; total production increased by 50%. It is estimated that 60% of plywood in 2000 was produced from tropical wood and the other 40% from wood (particularly pine) from the planted forests in the south of the country.⁶ Many of the mills in the old 'tropical' production zone in the northeast went out of business and new plywood mills were set up in the temperate south of the country.⁷ Now, pine plywood and combi plywood (with face and back tropical veneer and core pine veneer) are the major types of plywood produced in Brazil and their role is continuing to increase due to the growing availability of materials from the fast-growing pine plantations.

Most of the plywood industry in Brazil is now in the south of the country. In the year 2000, some 300 mills were in operation, of which 62% were medium and large-scale companies and 38% were small-scale companies. Forty companies accounted for 60% of plywood production capacity.⁸ The sector is organized through the Brazilian Association of Mechanically Processed Timber (ABIMCI).

⁶ ABIMCI, *Mechanically Processed Timber – Sectorial Study 2001*.

⁷ Brazil trades on its plywood strengths, *Wood-Based Panels International*, 17 July 2001.

⁸ USDA Foreign Agricultural Service, *Brazil Solid Wood Products Annual 2001*, 18 December 2001.

Table 1: *Composition of Malaysian forestry and timber-sector exports, 1990 and 2001 (% of total export value)*

	Logs	Sawn timber	Plywood & veneer	Medium-density fibreboard	Downstream timber products	Furniture
1990	45%	35%	11%	–	5%	3%
2001	11%	15%	28%	6%	13%	26%

Source: based on Malaysian Timber Council data. Downstream timber products include mouldings, builders' carpentry and joinery.

The larger part of Brazilian tropical hardwood plywood is consumed locally. Brazil's major export market is the European Union (EU), where it has competed successfully with US and Canadian softwood plywood exporters. Much of its exports (ABIMCI estimated 80% between 1998 and 2000) to the EU are of pine plywood and combi plywood, of which it is now the major supplier to several European countries and in which it has been gaining market share. The main marketing issue currently confronting Brazilian plywood exporters concerns the alleged non-tariff barriers of the European importers. ABIMCI is battling with European importers who are trying to limit Brazilian water-and-boil-proof pine plywood exports. ABIMCI claims that, under the guise of the UK 'Wood for good' campaign, the European trade is recommending that purchasers choose plywood that complies with the British Standard 5268 norm Part 2; currently only plywood from Finland, the US, Canada, the UK and Sweden does so. Brazil's own standards certification program is not yet accepted.

Another factor that will impact the Brazilian plywood trade will be the removal, by the EU, of Brazil's status as a Generalized System of Preference (GSP) country sometime in 2003. Once this comes into effect, Brazilian wood products will no longer qualify for GSP discounts; instead, the full applicable duty rate will be charged.

Given the importance of its domestic market and its relatively limited share of the international market, tropical plywood prices in Brazil do not always move fully in tandem with international prices. In the opinion of Brazilian operators, an important reason for this is the lack of transparency in the international plywood market. Also, Brazilian prices tend to follow rather than lead the market.

Consumer countries

The major ITTO member consumer countries are Japan, China and the USA; Japan alone accounted for 31% of world plywood consumption in 2001 and the three together for 60%. Probably all countries in the world consume at least some tropical plywood; other ITTO consumer countries accounting for more than 1% of world consumption in 2001 were the Republic of Korea (7%), Taiwan Province of China (8%), the UK (3%) and France (2%). ITTO producer countries accounted for 17% of world plywood consumption in 2001, mostly in Indonesia, Malaysia and Brazil.

Japan

Japan is, and has been for a long time, the world's largest consumer of tropical plywood. Tropical plywood accounted for almost 100% of its plywood consumption in 1990; even after the closure of many local plywood mills and the conversion of many others to produce softwood plywood, the market share for tropical plywood in Japan has remained at almost 80%.

There were 306 veneer and plywood mills in production in 2002, down from 354 in 2000 (and 420 in 1997). The overwhelming majority of plywood manufacturers are medium-sized or small enterprises; about two-thirds of production consists of standard plywood, one-third of specialty plywood. Most of the smaller mills concentrate on specialty materials (in 2000, 247 out of 354 mills only produced speciality materials). After past problems with log supplies, many Japanese plywood manufacturers have retooled their factories to use softwood rather than hardwood logs in plywood production (some 40% of local plywood production is now softwood plywood). This also means they are promoting this softwood plywood among their customers, carrying out research and adapting their products in order to capture a part of the hardwood plywood market. Building companies are often open to these overtures, as environmental pressures are causing them to make greater use of 'environmentally correct' plywood, which can be to the detriment of tropical plywood consumption. Many importers are also trying to convince their buyers to shift to softwood plywood, as they find the supply of hardwood plywood to be unreliable in terms of both physical availability and price stability.

In Japan, the general and specialized trading houses play a central role in the distribution of all imported and domestic panel products (they buy around 70% of domestic and imported panels). They supply raw materials to the local ply mills and buy their finished plywood products for on-sale to the wholesalers. They in turn supply about 95% of the panel products they buy to wholesalers for secondary processing and redistribution (only small quantities are supplied directly from wholesalers to end-users). It is important to note that the trading houses assume a lot of credit risk, using promissory notes to finance the wholesaler, distributor and even some end-users. See Figure 2 for an overview of the key players.

In the past, each intermediary in the marketing chain in Japan performed a specific function, without much overlap. However, continued price volatility and reducing margins have pushed the key players to:

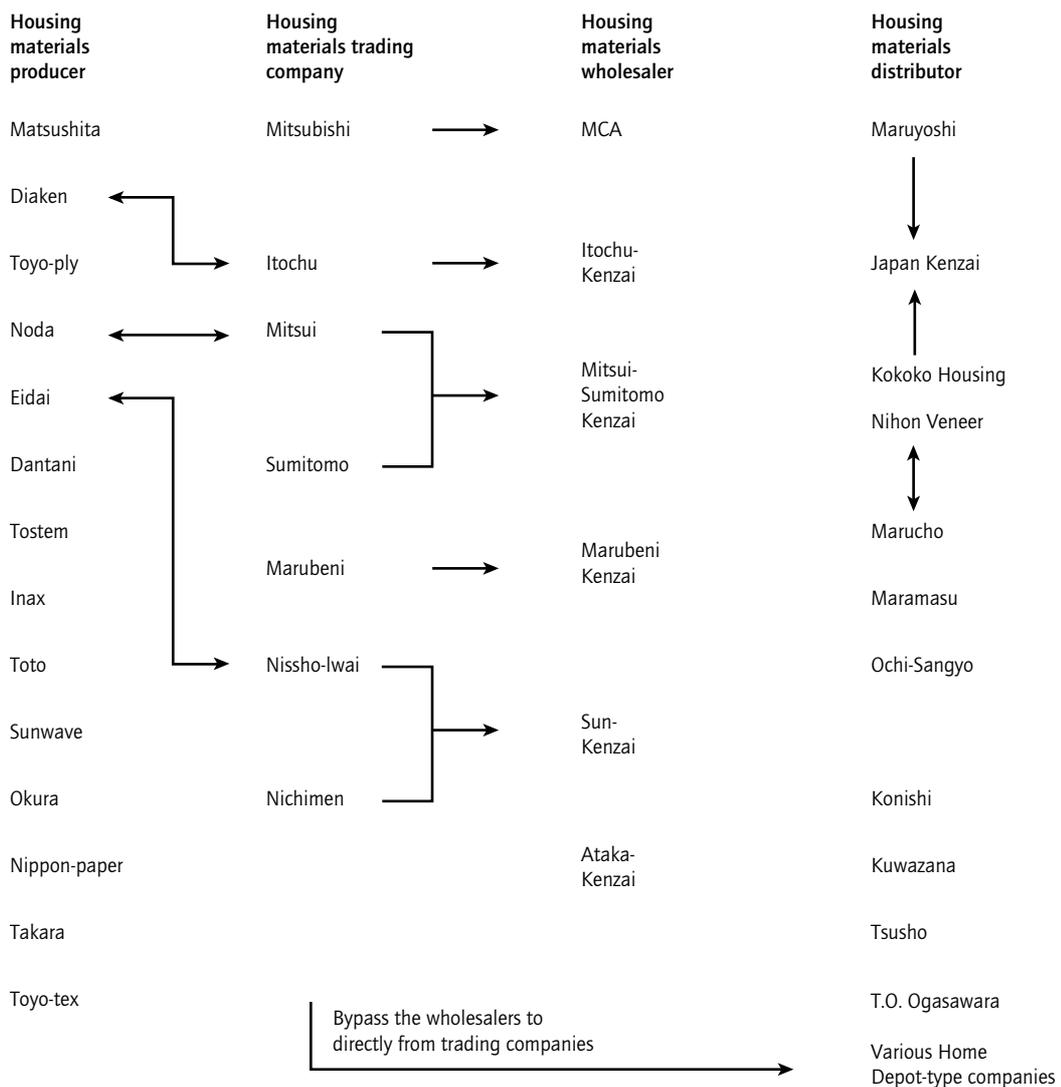
- buy more plywood direct from the producers either to access the intermediary margins for themselves or to minimize intermediary costs and thereby to operate more competitively;
- merge, to achieve economies of scale and to share the risk; and
- form direct links to home depots and major users.

As a result there has been much consolidation, both at the level of trading houses (eg the merger of the housing materials divisions of Mitsui and

Sumitomo) and at the distributor level (eg the merger of the two largest companies, Maruyoshi and Kokoku Housing).

An important development in Japan is the introduction of new standards for building construction, specifying very low permitted formaldehyde emissions for plywood used in the interiors of new buildings. Such building materials must now conform to the specifications as set out in the JIS (Japan Industrial Standard) and JAS (Japan Agricultural Standard). The relevant amendment to the Building Standard Law became operational on 1 July 2003, and tropical plywood producers have been slow in obtaining the necessary documentation to show that their products meet the new standards.

Figure 2: Japanese distribution channels for panel products: key players



This development in Japan may have a major influence on markets. Market analysts believe that Chinese exporters will be unable to meet these new requirements and will lose their market share. Also, few Indonesian exporters had met the requirements by the time the new regulations were introduced. Tropical plywood exporters may consider the following list of 'foreign certification organizations' that have been recognized as able to provide verification of the Japanese system of grading (JIS/JAS) for lumber and plywood:

- Canadian Plywood Association;
- Canadian Mill Services Association;
- Northern Forest Products Association (Canada);
- Plywood Association of Austral-Asia Ltd;
- TECO Corporation (USA);
- APA – The Engineered Wood Association (USA);
- Professional Service Industries, Inc (USA); and
- the Norwegian Institute of Wood Technology.

There is not a single agency from China, Indonesia or Malaysia on the list, which seems to serve as a good indication of the lack of organization in the tropical plywood sector compared to its softwood/temperate hardwood counterparts. In the absence of an approved local certification agency, a plywood mill has to apply to the Japan Plywood Inspection Corporation, which can be a time-consuming procedure.⁹

Among the possible consequences of these changes in regulations may be that Chinese and Indonesian plywood exporters will find that the market for their products in Japan has suddenly shrunk, as their plywood can no longer be used for the interior of new constructions. In response, they may decide to divert their plywood to other markets, thus depressing prices there. Meanwhile, Japanese prices may increase in the face of temporary shortages. In response to possible higher margins in the tropical plywood sector, local Japanese plywood mills, which can quite easily shift their production from softwood plywood to hardwood plywood, may well start importing tropical logs (thus driving up log prices).

In the short run, these developments will be favourable for those tropical plywood exporters who have managed to obtain certification of low formaldehyde emissions. But, in the longer run, they will act as an incentive for Japanese end-users to shift, where feasible, from tropical plywood to other plywood or wood-based panels.

United States of America

With some 40% of world production of wood-based panels, the USA is by far the largest player in the market. The US industry is mostly oriented towards its domestic market. With respect to plywood, the size of the US market is twice that of Japan and three times that of the EU. Oriented strandboard (OSB) has overtaken softwood plywood as the major wood-based panel produced in the USA. Softwood plywood production has been falling in recent years as a result of the strength of the dollar compared to the currencies of major Latin American producers (Brazil and Chile) and because of competition from OSB. Hardwood plywood production is barely an eighth that of softwood plywood (in 2000, 1.9 million m³ compared to 15.5 million m³).

Most of the USA's plywood imports are of softwood plywood, a product that the country also exports. The USA is a large importer of tropical hardwood plywood; despite this, tropical plywood still only accounts for less than one-tenth of total plywood consumption (compared to 45% in Europe and almost 80% in Japan). The main suppliers of tropical hardwood plywood are Indonesia and Malaysia, which together account for close to 80% of total supply in the USA.

Unlike Japan, with its many layers of wood products' wholesaling and retailing, the USA has a pattern of direct supply to the end-user. Distribution is not always carried out directly from the mill, but often through the producer's fully owned distribution networks (most of the large panel manufacturers have set up their own networks of warehouses from which distribution is organized). For imported hardwood plywood, large users (furniture manufacturers) will frequently buy direct for all or part of their requirements; otherwise they deal through regular agents and brokers or buy from trade houses (for example, several of the Japanese trade houses sell imported plywood).

⁹ Alternatively, a plywood supplier awaiting the JIS/JAS certification can apply for a 'Minister's Certificate', which would approve their plywood as acceptable construction material. But this is only supposed to be given for materials that do not fall under JIS or JAS standards.

China

This section, which is more detailed than other country sections because of the importance of China's influence on the trade in plywood, is based on interviews with plywood industry executives and experts in China (in particular, Dr Shi Kunshan, Professor Lin Fengming, and others); the report of an ITTO project (ITTO PD 55/99 Rev.1 (M)) entitled *Establishment of a sustainable tropical forest products information system in China* (Beijing, September 2002); and a report on China by Mike Adams and Hwan Ok Ma published in the ITTO *Tropical Forest Update*, 12/3, 2002.

Data for the Chinese plywood industry should be interpreted with caution. According to the aforementioned report from ITTO project PD 55/99 Rev.1 (M), China's statistics for the production, consumption and trade of forest products are in a comparatively confused state, "which could hardly be comparable with international statistics"; this confusion also causes "great difficulty to the planning effort and macro-control".

China has undoubtedly been the major dynamic factor in the plywood market in recent years and its influence is being increasingly felt in world markets, both by other producers and by consumers. With a rapidly developing economy and steadily rising living standards, production and consumption of plywood have been rising for some years. The production of other panels like OSB and medium-density fibreboard (MDF) has also been increasing, but over the past decade plywood has retained its dominant role in domestic wood-panel production at around 55% (compared to less than a third at a global level). In 1994, local plywood production was 2.6 million m³, compared to imports of 2 million m³ (mostly of tropical plywood). By 1997 it had almost tripled to 7.6 million m³. Growth then slowed; 9.9 million m³ of plywood were produced in 2001 (out of a total panel production of 22 million m³), which was about 18% of world production.

China's commercial forest area is split evenly between softwood and hardwood. Although domestic production of tropical timber in China is low, the rapid growth of tropical log imports has enabled the fast growth of tropical plywood production. In 1996, the country produced only 0.65 million m³ of tropical plywood. By 2001 it

had become the world's third-largest tropical plywood producer, after Indonesia and Malaysia, producing 3.4 million m³ in that year. The country is also the second-largest consumer of tropical plywood after Japan.

Not many years ago China was one of the world's largest importers of tropical plywood. Now, instead of importing plywood, China imports logs for domestic manufacture. Chinese plywood mills have established links with overseas log suppliers, buying from southern and central Africa, Russia, Papua New Guinea, the Solomon Islands, Indonesia and Malaysia. Some mills have also acquired forestlands or concessions in Africa, Malaysia, New Zealand and Russia. China's import tariff structure gives operators an incentive to import logs rather than plywood: there is a 6.2–12% import duty on plywood and none on logs.

The growth of log imports may slow in the years to come, however. In response to growing environmental concerns, China initiated a massive forest-protection program in 1997. With encouragement from the government, many enterprises (including some plywood mills) have developed large-scale plantations of poplar and other fast-growing trees. Other government incentives have stimulated farmers to plant trees (farmers are assured of a market for their trees, although the prices at harvest will be determined by market conditions). These plantations will be ready for harvesting in the next few years.

The Chinese government tightened its controls over forest exploitation in the late 1990s. The State Forest Authority (SFA) allocated logging quotas to the different regions but these were widely ignored. In 2000, for example, the quota was 47.24 million m³ and logging volume was estimated to be 26–33 million m³ in excess of this. Tightened controls seem to have been effective but the reduced local log supply has led to the closure of several timber wholesale markets. In early 2002, the SFA established the Forest Industry Administration Office (FIAO) to take charge of timber production, processing and supply. The FIAO is responsible for the management of China's forest-processing industry and major state-owned forests, as well as for making plans for the development of the industry, drafting regulations for wood-processing, and supervising the operations of forest enterprises.

The Chinese plywood industry is different from the tropical plywood industry in other countries in several respects:

- in many countries, the tropical plywood industry is declining, driven partly by difficulties in log supply. In contrast, the industry in China has grown rapidly in recent years, and is likely to continue growing in the future given the pace of investment in new construction;
- China's plywood industry consists of a small number of medium- and large-sized entities on the one hand and a large number of cottage industries on the other. In contrast, in most other softwood or hardwood plywood-producing countries, there are a small number of fairly large producers specializing in 'normal' plywood alongside a limited number of medium-sized plants focusing on laminated plywood and other specialty products. China's industry structure is discussed in more detail later;
- relatively little plywood is used in the construction industry – only some 10%, compared to about 30% in western countries and 60% in Japan. The reasons for this are twofold. First, bricks rather than cement blocks are used in much of the construction in China, meaning that less plywood is needed. Second, prior to the opening up of the Chinese economy, the country was short of plywood and the government stimulated the development of new steel-based technologies to replace wood in construction. Using steel plates rather than plywood is more labour-intensive; nevertheless, construction companies are likely to continue using the steel-based construction techniques to which they are accustomed as long as labour costs remain low; and
- Chinese producers have started what is becoming a major new trend in the tropical plywood industry, combi plywood, in which they combine relatively cheap wood as core material with tropical hardwood veneers (principally okoumé and meranti) for the face and back. In much of the country, poplar, a fast-growing temperate hardwood species, is the preferred choice for core material. In the country's south, however, radiata pine logs imported from New Zealand and Australia are used widely since poplar is not competitively available to many of the mills in that region. Neither poplar nor radiata pine provide the same structural strength as tropical hardwood but this is not an overriding factor when the plywood is used for interior decoration (the major end-use in China). It is estimated that 30% of plywood produced in China is made only of tropical hardwood timber, 60% has a tropical hardwood face and back and a core of poplar or radiata pine, and 10% uses only domestic timber (in particular poplar). Combi plywood's market share is growing; that of the other two is falling.

Exports of Chinese combi plywood combining a poplar or radiata core and a tropical hardwood face and back is making rapid inroads in the markets of other consumer countries. Table 2 gives the listed prices in February 2003 for several types of plywood from one of China's largest producers – the price advantage of using a poplar core is clear. The indicated thicknesses – 2.6–3 mm – represent the most common types of plywood produced in China.

Table 2: *Listed prices for various types of plywood, February 2003 (yuan/sheet)*

Grade	2.6 mm		3 mm	
	100% tropical plywood	Poplar core	100 % tropical plywood	Poplar core
BC	21.3	18.3	26	23
LC	18	15	23	20
S	12	11	15	14

Source: data provided by a major plywood manufacturer, Shanghai.

Box 1: A description of some of China's major wholesale timber and plywood markets

Some of China's largest timber markets focus on logs. For example, the Suifenhe Import Timber Trading Market, in the northeastern province of Heilongjiang near the border with Russia, trades over 1,000 m³ of logs a day, with over 400 traders reportedly active; or Alashan, in the Xinjiang Autonomous Region, which trades timber from Kazakhstan. The main markets for plywood, however, are on the east coast.

Dongguang Houjie Xingye Timber and Plywood Market

Houjie, Dongguang, located in the Pearl River Delta in the southern province of Guangdong, is a centre for furniture production in China and home to more than 2,000 furniture manufacturers, including over a thousand joint ventures. The privately owned Xingye Timber and Plywood Market opened for business in December, 1999 and is the largest timber distribution centre in South China. The market covers 320,000 m² and has 2,000 booths, divided into separate areas for timber, plywood and decorative board. The timber section of the market includes some 160 dealers, including 40 who deal in imported lumber. Roughly 60% of the timber and plywood sold in this market is imported, and a number of foreign companies have expressed interest in participating in this market. The market provides services including licensing for sales, transport, quarantine and inspection, and customs.

Shanghai Furen Forest Products Wholesale Market

The Shanghai Furen market is well known for flooring and plywood products. This market, covering over 80,000 m², is home to over 100 major foreign and domestic enterprises, and has quickly become a strong competitor to the Dongguang Houjie market for sales of imported wood products. Furen has benefited from a central coastal location that has attracted buyers from northern China. Over 50% of sales are tropical hardwood products, primarily from Indonesia and Myanmar.

Huadong Timber Market

The Huadong Timber Market was established in 1997 in the city of Dongyang in Zhejiang Province. The market includes 388 booths separated into sections for logs, processed products and timber-processing. Total sales in 2000 equalled 240,000 m³, primarily from tropical and temperate hardwoods. The processed products area is focused primarily on wood flooring and moulding. The market serves the large number of manufacturers that are located in Dongyang.

Nanxun Building Materials Market

Established in 1993 as a plywood market, the Nanxun Building Materials Market is located in Nanxun, Huzhou City, in Zhejiang Province. Nanxun registered sales of over US\$1 billion in 2000, with buyers from 20 provinces. The construction materials market has 140,000 m² of built-up space and hosts over 1,600 dealers. Like most other markets, it is divided into sections for plywood, floor panels, furniture, hardware and porcelain. Nanxun is a major centre for the wood-flooring industry, with annual flooring production of roughly 36 million m². The recent addition of a market for flooring has made Nanxun the largest production and distribution base for wood flooring in China. Timber demand for use in flooring is estimated at 3 million m³ per year, of which 90% is imported. Nanxun is also the largest plywood distribution centre in China, and its prices (reported, in Chinese, at <http://www.86mc.com>) come closest to setting a reference for the rest of the country.

Guangdong (General Chamber) Building & Decorative Material Chamber (BDMC)

BDMC was established in 1999 near Guangzhou, in Guangdong Province. It covers an area of 700,000 m², of which more than half is built up, with more than 2,000 shops specializing in plywood, furniture, etc; its annual turnover is more than US\$400 million, of which a third is for plywood.

Source: mostly taken from USDA Foreign Agricultural Service, Solid Wood Products Timber Markets in China, 28 November 2001, and from data provided by BDMC.

The big difference between the price for the lowest and higher grades indicates another aspect of the Chinese plywood industry: markets are segmented between a cheap, relatively low-quality product and a higher quality product that is much more expensive. The two have different consumer bases; low-income consumers, often in rural areas, consume much of the lower-quality plywood. The 'S' quality plywood produced by the company providing the data in Table 2 competes with plywood produced by cottage industries (including 100% poplar plywood), which is sold at 9–10 yuan a sheet, and thus has to be sold at a very low price in order to obtain a market. Higher-income consumers are quality-conscious and willing to pay a price for quality.

Table 3: International comparison of China's plywood consumption in 2000

	Per capita consumption (m³/1000 persons/yr)
World	10
USA	67
China	9
Japan	65
South Korea	35
Malaysia	71

Source: *FAO Forest Products Year Book, 2000*

Although China's population growth is low, steadily increasing incomes are enabling people to improve their housing situations; thus, growth in construction is fast. In China, plywood is now primarily used for internal decoration but, as Table 3 shows, there is much room for further growth in per capita consumption. Moreover, rising living standards are leading to a rapid increase in demand for higher-quality wood products, including tropical plywood. Production quality is also increasing in response to new health standards adopted by the Chinese government; imposing these new standards is not easy given the large number of mills, and it is leading to the closure of many of the smaller mills which cannot meet the new standards.

Industry structure

One can distinguish three industry segments in China: small-size/cottage, medium-size, and large-size.

The number of **small-size/cottage mills** is estimated at over 5,000. More than 2,000 of these are concentrated in the city of Linyi in Shandong Province, with a total production capacity of 3.5 million m³, a third of China's plywood capacity. Another 2,000 cottage mills are in Pi Zhou, in the northern part of Jiangsu Province, and 1,000 more are in Baoding and Wenan counties in Hebei Province. Other cottage mills are spread around the country, mostly near areas with large poplar plantations. Most are just family firms, often without any non-family employees. Some have up to 20 employees and, in a number of cases, several small-scale plywood mills have coalesced into larger companies. The majority of these mills specialise in either peeling logs or in gluing the veneers together to produce plywood; 10–20 peeling mills are required to ensure sufficient veneer for one gluing plant. Many of the mills that peel logs deliver their veneer to the medium-sized plywood mills and some of the gluing plants buy higher-quality veneers from traders or larger plywood plants in order to produce a higher-quality product. The quality of production of the cottage industry is at times rather good – industry sources estimated that in 2002 exports from this group reached over 600,000 m³, accounting for one-third of China's plywood exports.

Rather than peeling their own logs, **medium-sized mills** tend to buy veneers from large mills or the cottage industry; they may also import veneers. This industry segment accounts for some 30% of plywood capacity. It is concentrated in the city of Jiashan in Zhejiang Province, where some 200 mills operate. About a hundred other medium-sized mills operate in other parts of the country, many concentrated in Nanhai in Hainan Province. These mills include a number of joint ventures. In recent years, plywood companies from Taiwan Province of China, Hong Kong Special Administrative Region of China and Singapore have moved their

facilities to mainland China in order to take advantage of lower labour and land costs. A number of these companies export combi or 100% tropical hardwood plywood. For the mills in Jiashan, exports can be difficult because poplar plantations are quite far and, thus, core material is relatively expensive; most rely for their core materials on relatively affordable logs imported from Australasia and, to some extent, South-east Asia. Some specialise in producing blockboard or laminating plywood rather than plywood.

Large plywood mills account for less than 10% of total capacity. When plywood production took off in China in the late 1980s, state entities set up many large-scale plywood mills. Most of these went out of business because they were unable to compete against the cottage and medium-sized mills that started up in the early 1990s. However, new large-scale plywood mills were created in the second half of the 1990s, including a number of large joint ventures. Now, 113 firms are each able to produce more than 10,000 m³ of plywood a year, and seven of these more than 100,000 m³. Some of these large companies have invested in MDF plants. These are large, integrated plants that buy logs, peel them and manufacture plywood although often they buy poplar veneer as core material because cottage mills can produce this more cheaply than they can themselves. Apart from selling plywood they may also sell veneer or even logs. The larger mills export a considerable part (up to a quarter) of their production.

Marketing structure

A major part of the domestic sales of plywood is through well-organized wholesale markets; retailers, construction companies and laminating plants all tend to supply themselves from these markets (see Box 1). There are now hundreds of 'building materials' markets throughout China. A survey in 2001 counted 344 wholesale markets and 651 retail markets; of these, 82 were well established and the others were informal markets. These markets are mostly privately owned or joint ventures between the government and the private sector; a number of government exchanges set up in the 1990s were unable to compete with the private sector. Each wholesale market has a fairly large number of shops and warehouses rented out to wholesalers specialising in building materials, with some focusing on plywood.

Most of the medium-sized and large plywood mills deliver to a number of wholesale markets, and some of the wholesalers have premises in several markets. Several wholesale markets regularly report prices for plywood and other wood panels including, in a few cases, through their own websites. Both ITTO and the *China Timber Journal* (published by the China National Timber Distribution Association) report some of these prices on a fortnightly and monthly basis respectively. Plywood manufacturers report that the pricing on wholesale markets within any area is fairly well correlated and that wholesalers play a useful role in relaying price information.

The nature of price reporting on these wholesale markets indicates a certain lack of organization. Fortnightly price reports are made on different dates and for different plywood specifications, making direct comparisons between markets difficult. There is no indication of 'benchmarking', which is the pricing of the various thicknesses and types of plywood off a reference plywood. Price reporting is also quite passive, based on what is made available and there is little effort to fill the gaps in information supply.

International trade

China exported 1.79 million m³ of tropical plywood exports in 2002 and imported 0.64 million m³. Much of the export trade takes place through traders in Hong Kong Special Administrative Region of China and Taiwan Province of China rather than directly to the importing markets. In effect, Chinese plywood producers do not yet actively target overseas markets. China's imports of forest products increased rapidly in the second half of the 1990s, in line with the fast pace of construction in the country and its strengthened protection of domestic forest resources. In 1998 and 1999, forest products were the major category of imports. At the same time, there was a shift in imports, from plywood to logs. Initially, imported logs were used to produce plywood for the local market but soon China also found an outlet for its plywood on the world markets. Since 2001, China has become a net exporter of plywood; it is worth noting, however, that the country continues to import relatively high-value plywood (an average import value of US\$407 per m³ in 2002), while the plywood that it exports has a lower value (on average, US\$237 per m³).

China has made major inroads into the world market through highly competitive pricing. Chinese plywood is now gaining market share in all of Indonesia's and Malaysia's traditional markets. Chinese plywood is even being sold in Indonesia at a price defying all competition (even though some of the logs to produce the plywood were imported from Indonesia until Indonesian authorities decided to crack down on the illegal exports of logs in mid-2002).

There are several reasons why Chinese plywood can be sold so cheaply. First, it is a widespread practice in China to use a poplar core (poplar logs may cost a quarter of tropical hardwood logs) and a tropical hardwood face and back (combi plywood), while Indonesian and Malaysian plywood is 100% tropical hardwood. Second, the low labour costs in China translate directly into low processing costs and also make it possible to use much more of the log than is possible in Indonesia and Malaysia; recovery of veneer in China is over 70% compared to slightly over 50% in other countries.

The growth of China's plywood exports can be expected to continue and the Chinese presence is likely to be felt increasingly in the market. While there is a large ready local market for locally produced plywood, there is more than enough capacity to meet this demand. Continuing investment in new medium-sized and large mills, particularly by local entrepreneurs, and the expansion of the existing mills are also providing sufficient capacity to continue expanding exports. In fact, larger mills are finding it increasingly necessary to export in order to make full use of their capacity. In the local market, smaller, low-cost producers are formidable competitors. The market for imported plywood (from Malaysia and Indonesia) is likely to shrink further or, at best, remain stagnant.

The low production costs in China as well as the rapidly increasing supply of poplar (many plantations were established in the late 1990s) will enable this expansion to continue for some time. Only part of the expanding production will be placed on the domestic market, where demand will continue to rise rapidly. China's per capita consumption of wood-based panels, including plywood, is still below the world average and its rapidly rising income levels will continue to drive plywood consumption.

Nevertheless, the process of growth is not likely to be a smooth one. Certain plywood plants in China have already gone bankrupt. It can be very difficult to compete with cottage industry producers who may not pay taxes and may avoid health standards. Prices for face veneers, which need to be imported or produced from imported logs, are likely to increase in the years to come. At the same time, the more abundant supply of poplar, when all plantations come on stream, is likely to make competition difficult for companies that do not have easy access to poplar or which have high fixed costs.

Reintroduction of a plywood futures contract

China's plywood industry is poorly organized. Trust in the industry is weak – forward contracts are avoided out of fear of contract default; if there is indeed a contract default, recourse is difficult. There are three industry associations: the China National Timber Distribution Association, which is most directly concerned with plywood trade; the China National Forest Products Marketing Association, which focuses on production aspects; and the China National Forestry Association, which deals with log supply. There are also a number of provincial associations. However, these associations do not necessarily focus on plywood only and mostly concern themselves with the organization of meetings and the dissemination of information. They do not really make any efforts to create stronger standards in the industry or improve the quality of price reporting. Efforts to create a stronger plywood association have failed in the past in the face of strong individualism on the part of the producers.

Apart from strengthening the plywood associations in China to improve the organization of the Chinese plywood sector, one could also consider the reintroduction of a plywood futures contract, which would impose a certain external discipline on the sector. Such a reintroduction would have four major benefits for the Chinese plywood sector:

- it would provide a price reference for actual sales, and a 'forward price curve' (plywood prices for delivery in three, six and nine months), which would help companies to plan their operations;
- it would provide a quality reference for plywood producers: if they produce according to the quality standards specified by the exchange,

they know that they will always find a ready market. This, in turn, would help them to make better use of their productive capacity;

- it would provide a hedging tool: producers could lock in the price quoted on the exchange several months forward; and
- an exchange has a clearing department that interposes itself between the buyer and the seller of a plywood futures contract. Both buyer and seller would no longer be exposed to the risk of default by a commercial counterpart but to the risk of the clearing department. The Shanghai Futures Exchange (SFE) is owned by the Government of China, so the default risk of its clearing department is very low. The exchange would therefore make it possible for companies to enter into forward contracts with virtually no default risk.

A plywood futures contract was introduced in a futures market in Shanghai in 1993 and was also traded in Suzhou. The Suzhou contract was taken off the board in 1997, and the major contract, in Shanghai, was discontinued in March 1998. In 1995, this was the most actively traded futures contract in China, reaching a turnover during that year of US\$250 billion, but in the years thereafter turnover gradually fell as China's imports of tropical plywood declined. When the contract was introduced in November 1993, its delivery specifications were for Indonesian and Malaysian plywood, which at that time accounted for 70% of Chinese plywood consumption. By 1998, that share had fallen to 20%. The mismatch between the delivery specifications and the underlying physical trade made use of the contract for hedging purposes very difficult. The delivery process became close to unmanageable – with a dearth of deliverable materials, those with short open positions in the delivery month at times resorted to delivering sub-standard plywood and even Chinese plywood. Revising the delivery specifications of the contract was very difficult because Chinese production was still in an emerging phase. Much of the production was by small-scale and even cottage industries, and there were no standard grades that were widely adhered to. Under these conditions, the exchange saw no alternative but to close down the contract.

Foreign players would be able to use a plywood futures contract if it were reintroduced; this would be in contrast to the situation of 1998 and before, when foreign companies could only use the market through middlemen. Now, as long as a company has an operation in China it can use a Chinese market for futures operations, even to cover the price risk exposure that it runs for its operations in other countries. Repatriation of any profits on the exchange is possible under the normal capital controls. China's exchange control regime has already been partially liberalized and this process is expected to continue in the years to come.

The reintroduction of a futures market for plywood would need careful planning, for two main reasons. First, the large majority of the players in the Chinese plywood market (and in particular the large and medium-sized producers) started plywood operations only in 1997 or thereafter and have little or no experience in using a plywood futures market as a hedging tool. Indeed, they often recall the plywood market as a speculative one in which many lost money. Nevertheless, provided the exchange conducted sufficient awareness-raising, traders may be interested in using the futures market. The plywood market in China is characterized now by a serious lack of discipline. Buyers and sellers both feel that the risks of longer-term contracts are too large because either party may default if there is a short-term interest in doing so. An exchange clearing-house provides an immediate remedy to this problem.

Second, the design of contract specifications will be complicated. Contract specifications are important because they determine the extent to which the physical plywood market and the futures market will move together. Those who buy or sell in futures markets generally do not want to make or take delivery.

On the positive side, delivery locations should not be too difficult to determine when designing the contract specifications. Most of the plywood trade passes through large wholesale markets, all equipped with many warehouses. Since most of the larger plywood mills deliver to multiple wholesale markets and as these markets are fairly well integrated, delivery points can thus be expected to be representative of

the country's plywood sector. There are also multiple, highly competitive traders in each market, which should prevent anyone from manipulating the market. But on the negative side, there is as yet no single standard produced by the majority of plywood mills. The fact that plywood in one market may be physically different from that in another is not a problem in itself. After all, coffee beans vary widely from one origin to another and each country produces multiple grades – although coffee futures contracts are traded actively and used by a large number of worldwide players. Nevertheless, if it is to introduce a futures contract, an exchange needs to specify a range of acceptable specifications and grades for deliverable plywood. Experience in other countries shows that producers shift quite rapidly to the production of plywood that can be

delivered on the exchange, as this often carries a price premium. Therefore, it can be expected that the introduction of a futures market could, in itself, contribute to improving the organization of the Chinese plywood market.

The SFE is not, of course, restricted to plywood and the exchange managers have to decide whether to use resources to prepare the launch of a plywood contract. This is time-consuming; proper preparation would take at least a year. Given the many benefits for the tropical plywood industry of having a price reference and risk management tool, ITTO may consider providing assistance to the SFE in its interactions with the plywood industry. If the SFE seriously considers the reintroduction of a plywood futures contract, ITTO could give it a forum at one of its regular meetings.

3

3 Primary causes of market fluctuations and price volatility

Price variations are a normal part of commodity trade and efforts by producer groups to control price levels have generally failed. In the case of plywood, prices were fairly volatile even when APKINDO was operational. After APKINDO's collapse, they have become more volatile and are much more difficult to predict. Most other markets that have high price volatility have futures markets in which operators can lay off (transfer or hedge) their price risks. Since the delisting of the plywood futures contract traded on the Shanghai Commodities Exchange (SHCE) in 1997, such a market no longer exists for plywood.

This situation leaves producers, traders, end-users and others highly vulnerable to price changes. Under these circumstances, carrying a large inventory, for example, can be a costly mistake, as would be proposing a construction budget based on low plywood prices. This chapter contains a discussion of the extent of price volatility in the tropical plywood market and its likely primary causes: the inherent uncertainty associated with raw material (log) supply; competitive pressures among fellow plywood producers (in producer and consumer countries) and from softwood and other competing substitutes; and the prevalence of intermediaries in the market channel. The chapter concludes with a discussion of the links between plywood price volatility and the transparency of plywood prices.

Price volatility

Figure 3 gives an overview of plywood price developments since January 1997 for Indonesian 2.7 mm plywood, the single largest category of plywood. It can be readily appreciated from the figure that plywood producers are going through a difficult time; it may also be noted that prices tended to be higher in the five years prior to 1997, hitting in one instance a level of US\$780 per m³.

Table 4 compares tropical plywood price variations with that of a number of other commodities. Plywood prices are less volatile than those for, for example, sugar, cocoa or crude oil but more volatile, in the past few years, than for wheat or rubber (for example). Tropical hardwood plywood prices generally change 2–3% from month to month. This may seem small, but plywood mills make a margin on the difference between log costs and plywood prices: a 2–3% price change can have a significant effect on this margin. Moreover, in one out of four months, the price change from one month to the next is more than 5% and, occasionally, price changes in the 10% range do occur (see Table 3). Overall, the volatility index (measured as the average percentage deviation of average monthly prices from their exponential trend level for a given period) of tropical plywood prices is higher than those of many other commodities, including vegetable oils and most metals. For many of these other commodities, futures contracts are used actively by the respective industry, indicating that the type of price volatility that one sees on the plywood market would normally lead market participants to lay off their price risks – if only they could.

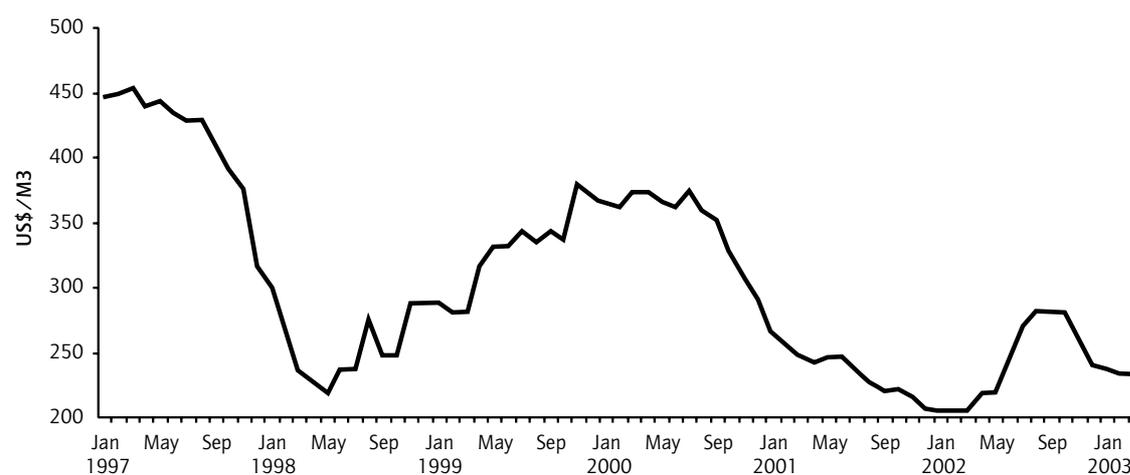
Table 4: Plywood price volatility compared to price volatility of other commodities

Product	Price volatility indices		
	1998-2001	1988-1991	1977-2001
	Percentage variation		
Wheat	6.6	12.5	15.3
Rice	5.4	5.4	18.6
Sugar	19.2	16.9	34.5
Coffee	8.0	11.3	26.0
Cocoa	15.8	10.3	18.6
Palm oil	14.5	11.7	26.1
Non-coniferous woods	1.8	5.5	10.5
Tropical logs	6.9	7.2	16.4
Tropical sawnwood	5.6	11.1	21.6
Tropical plywood	6.8	5.2	18.1
Rubber	6.0	6.5	21.8
Iron ore	3.5	3.1	7.7
Aluminium	6.8	9.2	18.8
Copper	7.6	9.5	22.5
Crude petroleum	17.6	14.2	29.3

Source: UNCTAD Commodity Price Bulletin. Note that the tropical plywood price series used here is for Malaysian 4 mm plywood in Tokyo – which has prices that are less volatile than 2.7 mm plywood, or FOB plywood prices.

The measure of price volatility is $\frac{1}{n} \sum_{t=1}^n [(| Y(t) - y(t) |) / y(t)] * 100$

where $Y(t)$ is the observed magnitude of the variable, $y(t)$ is the magnitude estimated by fitting an exponential trend to the observed value, and n is the number of observations. Accordingly, volatility is measured as the percentage deviation of the variables concerned from their exponential trend levels for a given period.

Figure 3: Prices for Indonesian 2.7 mm plywood, FOB Indonesian ports, January 1997 to March 2003 (US\$/m³)

Source: ITTO Market Information Service

The real extent of price volatility can be seen when one considers price changes over a six-month period, a fairly short time from the perspective of a plywood producer and certainly too short for him to make much change to his cost structures. Also, as producers generally do not sell more than 1–2 months forward, there is currently no way in which they can protect themselves against such price volatility. Table 5 gives further evidence of volatility. It shows that in a staggering two out of three cases, the price obtainable for Indonesian 2.7 mm plywood in a given month in the period 1997–2002 was more than 10% different from that of six months earlier and in one out of three cases the difference was more than 20%. Price differences can be positive or negative for plywood producers, of course, but the direction of price changes is not readily predictable by anyone. A 20% price decline over a six-month period will have a major impact on the cashflow of a plywood manufacturer and, unless it has large financial reserves or easy access to bank finance, could well limit its ability to finance its operations and plan its investments – and could send it bankrupt.

Further analysis of price data for different plywood specifications shows that all players in the plywood industry face price volatility. Among other things, price variations are large for all thicknesses of plywood; if anything, prices for thicker plywood are less stable than those for thinner plywood. For example, wholesale prices (in yen) in Japan for 11.5 mm foundation plywood and 12 mm concrete ply from Indonesia exhibit slightly larger movements than do wholesale prices for 2.4 mm plywood. This may be due to the fact that the market for thicker plywood is smaller and possibly more exposed to general economic uncertainty; thus, thicker plywood tends to be more prone to price shocks than that of the more actively traded 2.4 mm plywood.

It is worth noting that price volatility appears to be dampened further down the marketing chain (although it is still quite high). For instance, yen prices of 2.4 mm Indonesian plywood sheets in Japan remained unchanged from one month to the next 57% of the time during the period January 1997 to October 2002 (see Table 6). The same case

Table 5: *Frequency distribution of tropical plywood price changes for Indonesian 2.7 mm plywood, FOB Indonesian ports from one month to the next, and from one month to six months later, January 1997 to October 2002*

Percentage price change	0 %	0–5%	5–10%	10–15%	15–20%	>20 %
Compared to previous months						
Frequency of price increases	21%	16%	3%	6%	1%	
Frequency of price decreases		40%	7%	3%	3%	
Compared to six months earlier						
Frequency of price increases		6%	7%	10%	6%	14%
Frequency of price decreases		9%	7%	12%	7%	21%

Based on prices provided by the ITTO Market Information Service

Table 6: *Frequency distribution of hardwood plywood price changes for 2.4 mm Indonesian plywood in the Japanese wholesale market from one month to the next, and from one month to six months later, January 1997 to October 2002*

Percentage price change	0 %	0–5%	5–10%	10–15%	15–20%	>20 %
Compared to previous months						
Frequency of price increases	57 %	20 %				
Frequency of price decreases		19%	4%			
Compared to six months earlier						
Frequency of price increases	13%	9%	6%	8%	5%	
Frequency of price decreases		9%	34%	14%	2%	

Based on prices provided by the ITTO Market Information Service

Table 7: Frequency of Japanese softwood plywood price changes from one month to the next, and from one month to six months later (9.5 mm foundation of wall plywood), January 1997 to October 2002

Percentage price change	0 %	0-5%	5-10%	10-15%	15-20%	>20 %
Compared to previous months						
Frequency of price increases	32%	28%	4%			
Frequency of price decreases		32%	4%			
Compared to six months earlier						
Frequency of price increases	8%	22%	9%	6%	3%	2%
Frequency of price decreases		22%	7%	14%	8%	

Based on prices provided by the ITTO Market Information Service

Table 8: Frequency of OSB price changes (9.5 foundation for 2 by 4) in the Japanese market from one month to the next, and from one month to six months later, January 1997 to October 2002

Percentage price change	0 %	0-5%	5-10%	10-15%	15-20%	>20 %
Compared to previous months						
Frequency of price increases	49%	18%	1%	1%		
Frequency of price decreases		27%	3%			
Compared to six months earlier						
Frequency of price increases	9%	23%	9%	8%	2%	
Frequency of price decreases		13%	25%	6%	5%	

Based on prices from the Japan Lumber Reports and those provided by the ITTO Market Information Service

applied for prices of 3.6 mm plywood; these changed by more than 5% less than one month in 25. Price changes over a six-month period were larger than 10% in only 29% of the months during this period (compared to 70% for Indonesian plywood FOB prices) and were never larger than 20% (in the case of 3.6 mm plywood, this was in one out of six months compared to one out of three for the Indonesian plywood FOB prices).¹⁰

It can also be seen that price volatility (and thus unpredictability) of tropical plywood is much larger than that of other wood panels. For example, Japanese softwood plywood prices (using prices of 9.5 mm foundation plywood) moved more than 10% over a six-month period in only a third of the cases (see Table 7) and by 20% in only 1.5% of the cases (these changes were considerably higher for 3.6 mm hardwood plywood prices in Japan, at 43% and 18%, and for 11.5 mm Indonesian plywood for foundation as well as 12 mm JAS-certified Indonesian concrete form plywood they were higher still). While the stability of softwood plywood prices in Japan may be linked partly to

the fact that this product is still little used and often only produced for specific applications (in other words, it serves a niche market), plywood export prices from Finland confirm the relatively better price stability of softwood plywood. OSB prices are also relatively stable (see Table 8). After a period of rapid price falls in 1997, OSB wholesale prices in Japan stayed fairly stable thereafter. In the period under review they only moved more than 10% over a six-month period in 21% of the cases (compared to 70% for tropical hardwood plywood).

It is clear that stable prices for OSB and softwood plywood greatly facilitate the budgeting and planning of, for example, building companies. If a company plans to use tropical hardwood plywood for a project that will start in, say, three months and finish in nine, they run the risk of under-budgeting the costs of the plywood. Thus, it is not surprising that many end-users have shifted to the use of softwood plywood and substitutes such as OSB, often encouraged by importers who not only find the supply of these alternatives more reliable, but also, in a number of cases, have invested in their production.

The impact of the variable nature of log supply on plywood production

Many of the fluctuations in the plywood market are the result of fluctuations in supply. For uninterrupted plywood production the plywood mill needs a regular supply of logs, which can be difficult. Logs cannot be stored easily and, in many cases, log transport is by river, which means that if the water level is low, supply to the mills is disrupted. Moreover, competition for logs has intensified and plywood mills have to compete for a rapidly shrinking volume of logs. These factors make it difficult for plywood producers to deliver just in time. On-time delivery is very important: most of the importers do not really want to hold stocks because of the cost involved and the frequent fluctuations in demand and foreign exchange rates.

As a result, exporters need to be able to follow market trends closely and to negotiate appropriate delivery schedules, something that has caused more problems for tropical plywood exporters than for sellers of softwood plywood, MDF or OSB.

For consumer countries like Japan and China that produce tropical plywood, the log supply chain logistics are even more critical, since their production can be disrupted not only by inclement weather in the producer country but also during shipping. Also, wholesalers tend to order plywood for immediate delivery but traders may not have the specific types required in stock. Fluctuating availability itself can contribute to price volatility. This situation is quite different for softwood plywood, which is often produced in the consuming country and softwood plywood mills can, therefore, respond more easily to fluctuations in market demand.

To a large extent, such fluctuations in demand are also hard to avoid. A major part of plywood use is in the construction industry and construction spending depends on the general state of the economy.

Market structure characteristics conducive to price volatility

Traded plywood may pass through a number of intermediaries between producer and end-user. While these intermediaries add value they may also contribute to price distortions. They set their prices according to their own criteria, which include factors such as the prices of competing products and the pricing behaviour of competitors, and this weakens the transmission of price signals between producers and end-users. End-users cannot easily bypass the traders, not just because of practical problems (language, payment procedures, etc) but also because plywood shipments usually take several weeks from the country of origin, whereas end-users generally want immediate delivery.

The softwood and temperate hardwood plywood trade does not have so many layers. A larger proportion of trade is domestic, with shorter supply lines and an easier transmission of orders and price information. The adaptation of the industry to short-term changes in market conditions can therefore be smoother and prices more stable. Moreover, the softwood and temperate hardwood plywood sector is more concentrated, with the larger producers controlling a much larger market share than is the case for tropical hardwood plywood. For example, the ten largest producers control more than a tenth of world market production, and the largest producer, Georgia-Pacific Corp, accounts for almost 10% alone. This compares to a market share of some 4% for the world's largest tropical hardwood plywood producer, Indonesia's Korindo group. Few other producers account for more than 1% of world market production. Large producers have an interest in keeping the market stable and have the capacity to contribute to such stability through their marketing behaviour.

It would also appear that the softwood plywood industry is better organized than the tropical hardwood plywood sector. Some of their associations play an active role in exchanging price-relevant information, allowing members a calculated reaction to market shocks. For example, the Engineered Wood Association (APA), the major wood-based panel association in the USA, annually produces a five-year regional production and market outlook for structural panels and engineered wood products. This report contains economic forecast assumptions, market segment analysis and demand data, historical production and capacity data by product category, regional production statistics, export and import figures, and other information. In addition, the APA provides weekly market information. BC Wood, in Canada, gathers information about competitors, potential new clients and new market opportunities.

Links between market transparency and price volatility

Uncertainty is a major contributor to price volatility. Lack of market transparency makes it difficult for producers and consumers to react smoothly to changes in the supply/demand equation. Producers tend to over-react, trying to undercut their competitors not by 1% or less, but by several percentage points (note that in many other commodity markets, price adjustments are much smoother and price changes less radical, because the 'current market price' is

known to all). These over-reactions are also driven by the fact that producers are normally in a vulnerable market position, having sold only one month forward, and are thus forced to find a willing buyer for the production of 1–2 months in the future and beyond.

In a rising market, the opposite happens. Producers try to drive up prices while the buyers, uncertain about the market situation and afraid of having a lack of supply, pay a price premium.

Unpredictable regulations do not help either. Risk-averse producers or consumers will avoid taking any positions (eg holding stocks) that put them at risk of being affected by changes in government decisions. A lack of transparency about regulations and the way they will be implemented is therefore an immediate contributor to plywood price volatility. In this regard, the situation in Indonesia in recent years has been of considerable concern to the industry. Not only have regulations changed regularly, it is also not clear to anyone, including the Indonesian plywood industry, whether regulations will be enforced and, if so, when and how. Indonesian plywood production has thus shown a 'stop-go' pattern in recent years, with production levels reflecting fears about eventual regulatory actions rather than market expectations. In addition to this uncertainty, sales decisions are driven regularly by cashflow considerations; overall, this did not add to Indonesia's image as a stable supplier.

4

4 Market transparency and the risks associated with price volatility

The current state of plywood market transparency

Market information on tropical plywood is available from ITTO, and from a range of other sources – Annex 2 gives an overview of the information sources available on the internet.

The most comprehensive market and price information is gathered and distributed by ITTO; no other regular information source even comes close to the width and depth of this. The other regular information sources – particularly the trade press – tend to focus on their national markets, giving scant attention to the international marketplace. The Malaysian Timber Council produces monthly market reports for Malaysian companies from its offices in the UK, Dubai and China, but these are not as comprehensive or regular as the ITTO reports. The US Department of Agriculture provides wood-panel reports written by US commercial attachés in a fairly large number of countries, but these are at best quarterly, and, except perhaps once a year, do not go much beyond statistical information.

Market participants consider the currently available tropical plywood market information to be insufficient. The large majority of those responding to the questionnaire distributed by the authors said that there was no clear pricing mechanism by which plywood prices are developed and that there is no readily available, accurate, reliable and timely information about plywood market trends and prices. Price risk exposure stood out as their key concern in terms of the major variables that affect their company's performance, more important than sales volume, changes in raw material costs, capital costs or labour costs.

ITTO's price estimates are based on informal surveys because the prices at which trade actually takes place are not registered publicly; rather, public price quotations depend on informal surveys of buyers and sellers. These informal surveys are normally conducted among a fairly small group of companies and the basis for price estimates is not identical

from month to month. For instance, if in one month one has price quotations for three exporters from Peninsular Malaysia and three from Sabah and Sarawak, the reported price evidently gives a weight of 50% to the quotations from Peninsular Malaysia. If in the following month there is one price quotation from Peninsular Malaysia and nine from Sabah and Sarawak, in the resulting reported price the weight for the quotation from Peninsular Malaysia is only 10%. This clearly can have an impact on the level of reported prices. In addition, reported prices may not always reflect actual trade prices; for example, buyers may benefit from discounts that vary depending on the market situation. Perhaps, in cooperation with a panel of private-sector representatives, ITTO could improve its price data-gathering system to bring it closer to the price reporting systems used in oil and metal markets.

The relevance of price risk exposure

Not only do market participants say that they are exposed to price risk, the conditions of the market and the commonly used marketing practices also indicate the seriousness of this exposure.

First, the industry is characterized by low profit margins. The majority of mills are under pressure from rising log prices and relatively low plywood prices (which are partly the result of competition from cheaper substitutes such as OSB and MDF). At the same time, the lack of logs forces them to produce much below full capacity. Normally, one would expect a number of the plywood mills to go out of business, thus leaving more logs for the survivors, but this adjustment process is hindered by the costs and difficulties of closing mills, particularly in Indonesia. The profit margins on plywood operations are important to Indonesian companies and, while most are part of larger groups, they are often independently registered companies that are diversified outside the timber sector.

Log costs account for around 50% of production costs in Sabah and Sarawak and up to 60% in Peninsular Malaysia. In Indonesia, log costs may be as high as 60% or even 65% of plywood production costs. Even if plywood prices decline, log prices rarely react to the same extent, for several reasons:

- there is considerable demand for logs from the plywood industry in other countries (eg China and Japan);

Table 9: Example of the impact of price changes on plywood mill profit margin (figures in US\$/m³)

	Starting position	Plywood price + 10% Log price + 3%	Plywood price - 10% Log price - 3%
Plywood price	272	299.20	244.80
Log price	157.80	162.60	153.09
Profit/(loss)	12.31	21.44	(42.87)
% change from starting position	–	473%	(380%)

Authors' calculations, based on industry data on production costs.

- tropical plywood producers normally have to compete hard to obtain logs. Most plywood mills operate at half capacity (only one shift instead of the two technically feasible) because of the difficulties in procuring raw material; and
- the plywood industry has to compete with sawmills for logs.

In other words, when plywood prices decline, plywood mills cannot automatically pay lower prices to their log suppliers.

This problem is illustrated in Table 9, which looks at the impact of price changes on profits. This example is based on typical price movements, with a log price change that is less strong than the change of plywood prices. Typically, if plywood prices increase by 10% over 1–2 weeks, log prices only increase by about 3%.

A comparison of the impact of price volatility with that of other key variables affecting the performance of plywood mills –sales volume, price of direct raw materials compared to logs, the cost of capital (depreciation and finance cost) and direct labour – was undertaken. This confirmed that the impact of changes in the product price on profit dwarfs the impact of any other variable. Plywood prices are thus the key to company success or failure.

As mentioned, short-term sales are prevalent in the sector. Most plywood is sold one or two months forward, and sales are hardly ever for periods beyond three months forward. This hinders the capacity of mills to plan their production: that is, to determine which types of logs they need, to procure these logs in time and at an acceptable price, and to organize the logistics of production and transport in such a way that delivery is on time. The main reasons for this lack of forward contracting are, first, the difficulty in setting a forward price that is acceptable to both parties and, second, the fear (particularly among producers) that if a price has been set but

market prices fall before delivery, the buyer will default on his obligations. In the responses to the questionnaire distributed by the authors, the ability to better plan forward sales was most often mentioned as the major consequence of introducing a tool for producers to manage their price risk.

Payment methods are also indicative of high risks. In the timber and wood-panels market, the predominant form of payment is the letter of credit. This is a relatively expensive form of payment, but it is common when there is a serious risk of payment default. Payment defaults, in turn, can be the result of exposure to price risks (price changes encourage contracting parties to default). It is worth noting that, for producers, letters of credit provide only incomplete protection against a buyer's default. Buyers can often negotiate a price discount if world market prices decline after signature of a fixed-price contract since, in practice, letters of credit very often have carry discrepancies; sellers do not have this luxury. In some cases, buyers conveniently 'forget' to open a letter of credit in a falling market, while in a rising market some sellers fail to make shipment even after receiving the letter of credit.

Experiences with efforts to create organized plywood markets

Plywood manufacturers regularly hedge their income or payment flows when it come to exchange rates. They also insure their factories, people and other assets against all sorts of accidents and uncertainty. Unfortunately for most of them, there is no insurance to protect against the biggest and most common risk, the risk of their product price falling suddenly lower than forecast or raw materials suddenly costing much more than projected. The lack of any such insurance means that the plywood mills are unwittingly assuming a speculative risk on the direction of their product and raw material prices.

No transparent tropical plywood price discovery mechanism presently exists to help anticipate price volatility, and no tool to manage the volatile price. For many other commodities, there is a tool that reaches both objectives: a futures market. A futures market can act as a hedging tool to protect a company against adverse price movements. If such a market were to exist, a decision not to hedge (manage the price risk) in an environment of price volatility would actually be a decision to speculate.

The United Nations Conference on Trade and Development (UNCTAD) conducted a study on the feasibility of a tropical plywood futures contract in 1998.¹¹ The study concluded that a plywood futures contract for tropical hardwood plywood was not only viable, it would also provide possible solutions to several problems hampering the further development of the international plywood trade. However, the 1997 Asian financial crisis, coupled with structural changes in the tropical plywood industry, stopped efforts in Malaysia to introduce such a contract.

Futures contracts have for a long time remained largely absent in the wood-panel industry. A lumber contract has been trading since the early 1970s in Chicago, but its volume has never been very high; proposals to introduce plywood futures in Japan and lumber contracts in Europe, which emerged in the early 1980s, were never realized.¹²

The 1990s, however, saw a series of new futures contracts for the wood-panel industry. The most successful of these came in 1993, when two exchanges in China, the SHCE (in Shanghai) and the Suzhou Commodity Exchange (Suzhou is just north of Shanghai), introduced futures contracts for tropical hardwood plywood.

The SHCE was the larger exchange. Its futures contracts were on the basis of plywood imported from Indonesia or other origins at a discount or premium (on delivery, there was a discount for plywood of Malaysian origin). The contract was

for a standard parcel of 200 4x8-foot sheets of plywood, with a thickness of 2.7–3.2 mm; the quality standards used were BB/CC (a British standard) or those of the Japan Plywood Inspection Corporation (JPIC). Delivery was possible into and from nine exchange warehouses in Shanghai and Ningpo, another port near Shanghai. Trade on the SHCE was very active – its annual volume reached US\$250 billion in 1995. While small speculators accounted for a very large part of turnover, most Chinese plywood companies (and even a number of Indonesian exporters, through middlemen in Hong Kong Special Administrative Region of China) were also very active. Access was easy, since the exchange had trading floors in several other towns in China, linked by satellite.

In the late 1990s, however, the Chinese government decided to crack down on commodity futures exchanges, feeling that their speculative use had become too strong. The Suzhou exchange was disbanded, while the SHCE merged with the Shanghai Metals Exchange to form the Shanghai Futures Exchange (SFE), and its plywood futures contract discontinued. The SFE is authorized to list plywood futures but has not done so yet.

In the United States, where an attempt to introduce plywood futures failed in the 1970s, futures contracts for wood-based panels were introduced by the Chicago Board of Trade (CBOT) in 1994 and by the Chicago Mercantile Exchange (CME) in 1996. The CBOT contract was an index contract based 50% on softwood plywood prices and 50% on OSB prices and its trading unit was 100 m³. The index was constructed on behalf of the Exchange by a specialized company, which contacted a total of 30 companies out of a pool of 60–90 potential quote suppliers to obtain the FOB mill prices at which they were willing to sell. The CME introduced a softwood plywood futures contract as well as an OSB futures contract; both, in contrast to the cash-settled CBOT contract, were delivery-settled. All three contracts were discontinued after a few years because they failed to attract sufficient liquidity.

Also in the wood industry, two Scandinavian exchanges introduced pulp futures contracts in 1997. The Finnish Options Exchange (FOEX) introduced the first contract in February 1997 and the Swedish OM Group followed in the second half of 1997 through its Pulpex subsidiary; both have survived so far. Liquidity is better in the

¹¹ UNCTAD/ITCD/COM/12, 1 April 1998.

¹² According to an industry observer in 1986 (Roderick Seeman, *The Japan Lawletter*, April 1986) "Japanese distributors of plywood have been seeking the establishment of such a [futures] market since 1970 in order to limit their risks. A study group established for the problem by the Ministry of Agriculture and Forestry agreed that such a futures market should be established. This was conditioned on the agreement of plywood makers. The plywood makers have never agreed. They believed that the establishment of such a market would take price setting power away from them."

Box 2: E-commerce initiatives relevant to the plywood industry

Asia Wood, www.asiawoodweb.com, offers a bulletin board for the timber and plywood industry with the aim of developing a more sophisticated marketplace.

The IHB Timber Exchange, www.timber-exchange.com, offers a bulletin board for timber and wood-based panels for a mostly European public.

The International Wood Products Association (IWPA), www.iwpawood.org, is the US association for the promotion and enhancement of trade in imported hardwood and softwood products. Among other things, it produces IWPA eNews, a weekly email/fax bulletin that reports US import statistics and other time-sensitive information. IPWA has a market research service which can do market studies on demand to determine product and market trends, challenges and opportunities, and potential problems. IPWA also operates a wood products' and information exchange, an e-trading tool which can be used to provide trade leads, including for companies looking to source imported woods.

Random Lengths Woodwire, www.randomlengths.com, provides information about the US market for wood products, including daily-updated plywood prices. It also has a weekly newsletter on international wood products' markets.

Sticktrade, www.sticktrade.com, is a B2B site for buyers and sellers of hardwood and softwood lumber, logs, plywood, veneer, flooring and other wood products.

Timberhunt, www.timberhunt.com, is a B2B e-market, information source and network for the timber, wood and forest products' industries, including plywood. It supplies online trading, industry news and a timber industry business directory. It also provides information about latest prices and timber market trends.

Timberweb, www.timberweb.com, is a global timber and lumber e-market; it also offers a forum for the trade in wood panels.

Pulpex futures market, perhaps because, contrary to the FOEX contract, it is settled through physical delivery. Both contracts are based on the same type of pulp (northern bleached softwood kraft), which accounts for less than one-third of total world pulp production but whose prices show a high correlation with many other pulp prices.

A number of internet initiatives (see Box 2) could help provide better market transparency, but these act merely as commission agents. They offer no counterparty guarantees and no performance guarantees. The bids and offers on the exchanges are for immediate delivery and there is no trade

in forward contracts. Contract definitions are not standardized, which makes it difficult to really interpret market movements or to identify the 'equilibrium' price. Transactions tend to be small; the internet exchanges are not yet suitable for the US\$50,000 to US\$100,000 typical transaction sizes of the plywood industry. Under current conditions the exchanges may also be difficult to sustain; a first contact may be made through the exchange but, if successful, the buyer and seller are likely to work directly in the future. In the light of all this, considerable improvements will be necessary in the internet exchanges to make them truly useful for international trade in tropical plywood.

5

5 Recommendations

The tropical plywood industry needs to find ways of confronting the dual challenges of declining supplies of logs and increased competition from softwood and temperate hardwood plywood, and from other wood-based panels. There is no magic bullet, no simple solution to the tropical plywood industry's problems. Rather, there is a set of measures and practices that could strengthen the industry and help it face these challenges. The recommendations made here focus on the particular issues of market transparency and ways of dealing with market fluctuations and price volatility. These are important issues for the tropical plywood industry: a lack of transparency weakens the ability of the industry to respond to competitive pressures. Market fluctuations can make tropical plywood less attractive than other panels in the eyes of buyers and an inability to deal with price volatility can cause financial distress to plywood firms. Some recommendations can be implemented by individual companies or by cooperating companies at the country level, but others will require an expansion of ITTO's activities. While not all recommendations are for ITTO, the Organization can in all cases play a major role in making the tropical plywood industry more aware of the nature and extent of the challenges that the industry faces and help it design responses to these challenges.

Industry interaction

Better industry interaction at the national and international levels can be an important tool for the tropical plywood industry to reach the 'critical mass' needed for the active protection of the industry against competition from other wood panels. Such interaction would lead to better information flows. Currently, the flow of operational information, such as on market prices, and of strategically relevant information on major developments in the industry in the tropical plywood industry leave much to be desired. While market players may feel well informed about the conditions in their region or, at best, country, they often have poor information on industry-wide conditions and developments.

Strengthened interaction would also allow the industry to better defend its interests at the national and international levels. While it has so far been difficult for the tropical plywood industry to cooperate effectively, the fact remains that it is in need of 'lobby' and promotional organizations that can defend tropical plywood against other wood-based panels. Producers of softwood and temperate plywood panels are well-organized and engage in an active promotion of their sector, against which the tropical plywood industry as yet has no organized response. It is only through cooperation that the tropical plywood industry will be able to 'sell' itself in the face of not just environmental concerns but also the active efforts of softwood plywood producers to push their products. It is worth pointing out that in Japan one finds representative offices of: the USA softwood plywood industry APA; the Canadian Plywood Association; and (for Australia and New Zealand) the Plywood Association of Austral-Asia. All three actively promote their plywood in Japan. Canadian and US organizations also actively promote their timber and wood products in China: for example, the Council of Forest Industries, Canada (COFI) has been very active in the Chinese market. Its activities include conducting a series of seminars, building several demonstration structures in different locations throughout China, and being involved in revising Chinese building codes. COFI also sponsored a mission of key Chinese building-code officials to Canada in February 2001. The Ministry of Construction in China and the Canadian Mortgage and Housing Corporation have signed a memorandum of understanding to cooperate on housing technology-related issues.¹³ The only promotional office for tropical hardwood is that of the Malaysian Timber Council in Shanghai, China (which also covers Japan). The Malaysian initiative is commendable, and perhaps other producer countries can join in this and similar efforts so that the activities can be expanded to the level reached by COFI.

¹³ USDA Foreign Agricultural Service, *China, People's Republic of, Solid Wood Products Annual 2001*, 18 July 2001. Another example of the organized marketing efforts of US associations is Mexico. In 2002, in an investigation on plywood imports into Mexico (mostly from the US), Mexico's National Association of Plywood Producers (ANAFATA) cited the marketing programs of the American Forest & Paper Association, which has been working in Mexico since 1993, and APA (the Engineered Wood Association), which has been working since 1994. It estimated that the US government funds given to the two forest product associations to operate in Mexico is approximately USD\$500,000 per year (USDA Foreign Agricultural Service, *Mexico announces a global safeguard investigation against plywood imports*, 9 November 2002).

National efforts

Information-sharing should start at the national level. It is particularly important that the major producing countries become well-organized so that they can actively promote the industry, instil a certain discipline in the sector, and generate enough information for other countries to understand how that country's plywood sector is doing and in which direction it is going. The Malaysian and Japanese industries are well organized. For example, the Sarawak Timber Association shares export price indications among its members and passes on requests for plywood and timber, and the Malaysian Timber Industry Board circulates a weekly newsletter summarizing worldwide industry developments. On the other hand, the Indonesian plywood manufacturers' association, APKINDO, has lost many of its earlier functions, while the rapidly growing Chinese industry has not become organized.

Despite all its problems and distortions, APKINDO was once a good conduit for verifiable information on the Indonesian industry; now, however, Indonesian companies have lost much of such market-sharing and should consider new ways of improving the flow of information within the country. It can also be hoped that the Chinese plywood industry will develop an active forum of manufacturers, importers and exporters and major end-users for the exchange of information. This would be in the interest of the Chinese companies themselves: it would create a more organized marketplace (even within China, prices vary widely from one region to another) and help the industry to discuss quality standards and to learn how to meet them. Cooperation would also be a useful tool for gathering market information (for example) when Chinese companies start developing new markets (as they do now). Also, in a competitive environment such companies will need good information in order to make proper business decisions.

In all, better and more organized information-sharing at the national levels of producer and consumer countries would provide the foundation for market transparency in the plywood sectors of those countries. This in turn would lay the foundation for improving market transparency at the international level through bilateral and multilateral cooperation among ITTO's tropical hardwood member countries.

International efforts

ITTO is the central organization for the world's tropical hardwood industry, including for tropical hardwood plywood. No other international body has such a wide range of activities in support of the industry, from price information to the reporting of statistical data and the analysis of industry trends. In contrast to many other commodities, there are no international private-sector bodies (eg an international industry association) or other entities (eg the specialized press) able to take on the roles currently played by ITTO. It is thus likely that ITTO will have a central role to play as a forum, or at least a catalyst, for national efforts to improve industry interaction. National industry associations can exchange information, as the Indonesian, Japanese and Malaysian associations now do through cooperation. Also, regional organizations such as the ASEAN Panel Products Federation (APPF) can play a role.¹⁴ But such cooperation has its limits.¹⁵

The following roles could be envisaged for ITTO:

- support national-level efforts towards organization;
- organize the exchange of information among private-sector operations;
- improve its own data-gathering and disseminating operations;
- set up a price information network; and
- stimulate the emergence of plywood-specific websites for the support of the community.

The first aspect of ITTO's role is that it should support national-level efforts to organize. ITTO's project on the establishment of a sustainable tropical forest products information system in China (PD 55/99 Rev.1 (M)) is a good example of how ITTO is providing such support.

¹⁴ APPF was formed in 1979 as the ASEAN Plywood Federation, changing its name to APPF in 1982. The Federation brings together buyers and sellers from the region, organized in national associations. Non-ASEAN member countries and regions such as Australia, Hong Kong Special Administrative Region, Republic of Korea and Taiwan Province of China are observer members.

¹⁵ For example, in 2001 the Malaysian Panel Products Manufacturers' Association (MPMA) and its Indonesian counterpart, APKINDO, decided to set up a joint marketing group to help stabilize the prices of tropical plywood products in their major markets. It has proven impossible to implement this decision, or other decisions to act jointly to control market fluctuations. The efforts of APPF to coordinate Indonesian and Malaysian plywood prices have also been unsuccessful.

Box 3: *The Trade Advisory Group*

The TAG was set up in 2000 to provide input to the policy debate in the ITTO Council. Participation in the TAG is open to anyone with an interest in the tropical timber trade, including representatives of tropical forest industries, timber exporters and importers, timber trade and industry consultants, and trade and industry associations. Through the TAG, these parties can participate (at zero fee) in the networking prior to sessions of the International Tropical Timber Council, and attend the Council sessions themselves, either as part of a member country delegation or as an independent observer.

Such national organizations can form the basis, in principle, of a Global Plywood Association that would include the plywood industry from ITTO's producer members as well as the large producers among its consumer members (particularly Japan and China). ITTO could provide a platform for such national associations to increase their international interaction. Incidentally, organizing such industry meetings is an affordable way for ITTO to improve its own information-gathering and analysis.

Further, through support to the development of national exchanges of opinion and information on plywood issues, ITTO could enhance its role as a forum for private-sector/government interaction. One problem common to the international plywood industry is the fact that government policies are rarely stable. This causes cash squeezes and uncertainty in national economies and creates overall volatility in the market. If, in the framework of ITTO, governments could become more aware of the constraints and modus operandi of the private sector, this could help them to improve policy-making.

Second, ITTO can increase its role vis-à-vis the private sector to act as a catalyst for improving communication between private-sector players and to improve the private sector's understanding of worldwide trends. For example, the tropical plywood industry now has fairs where plywood products and machinery are exhibited, but there seem to be no industry meetings focused on the economic issues affecting the industry. If ITTO takes the lead in organizing such meetings, interest from the private sector is likely to be strong; now, many decision-makers have difficulty in gathering the information they need for proper decision-making. If such industry meetings were organized alongside the regular ITTO meetings they would have the added benefit of improving the

participation of the private sector in ITTO government delegations. The creation of the Trade Advisory Group (TAG; see Box 3) by ITTO was a commendable initiative; its role could perhaps be further expanded to cover the areas indicated.

Third, and on a more pedestrian level, ITTO could expand the information it gathers on trade flows and assist its member countries to improve the quality of information that they provide to ITTO. ITTO trade flow statistics now only refer to member countries. This leaves at least one important new importing region, the Middle East/West Asia, outside ITTO statistics; of the countries in this region only Egypt is an ITTO member. Plywood demand from these countries can have a major impact on the market; for example, the reconstruction of Iraq will undoubtedly create a large demand for plywood.

ITTO statistical data suffer, at times, from large discrepancies in its member countries' declarations. One reason for these discrepancies is that the customs codes for the plywood sector are far from clear, and customs officials make many mistakes; a large part of plywood imports and exports end up in the 'other plywood' category because customs officials don't know how to classify them. With support from its member countries, ITTO could work with the relevant international harmonized system authorities to make these codes clearer (they are revised every seven years). ITTO already produces many valuable materials, which perhaps can be disseminated more widely, especially to new producers.

Fourth, many other commodity industries have an efficient price information system, centred around either a futures exchange or an organized system for gathering and distributing real price data (often done by specialized industry publications). For each of the market participants, the benefits of knowing what the price level is could be valuable

enough to overcome their reluctance to share some of their own 'confidential' information. There is not really a worldwide plywood publication. National associations could in principle take the lead in gathering real price data, but nowadays it would be quite difficult for many associations to gather reliable data on the export prices of their member exporters.

A full and frank information flow (especially on production and trade) among producer and consumer members would improve the transparency of the market and the confidence of the world plywood market, particularly in the face of competition from other wood-based panels. In practice, short-term commercial interests hamper efforts for direct information flow; thus, an intermediary is needed. In the absence of a worldwide plywood publication, ITTO could design a mechanism to gather such information – eg through a weekly telephone survey of seven plywood mills selected out of a larger group for each of the larger producing countries. A good estimation would be obtained if the lowest and highest price quoted for a type of plywood was excluded from the calculation. Having such an average export price for Indonesian plywood, for example, without anyone other than the responsible ITTO officers knowing which companies gave their prices, would be particularly useful, not just for Indonesian exporters but for the industry as a whole. With a trusted system, individual companies would have no reason not to report real price levels.

Finally, governments could facilitate or stimulate the emergence of private-sector-operated websites for the plywood industry (and tropical timber in general) by assisting in the collection of data.

Moving into value-added activities

By moving into specialized, 'non-commodity' types of plywood, or moving further up the marketing chain (by producing more sophisticated products or by bypassing the middlemen), a producer can not only retain a larger part of the plywood value-added but also reduce his exposure to market volatility. This latter would result from several factors. In some cases, products can be sold according to 'catalogue' prices, which stay stable for 6–12 months. The larger absolute prices for the plywood also dampen the effect of price movements: a price change of US\$10 per m³ is less significant for a

product with a price of US\$400 per m³ than for a product with a price of US\$300 per m³. Moreover, price factors become less important in downstream markets than product quality, service, and timeliness and ease of supply.

It is therefore worthwhile exploring the extent to which producers can move up the marketing chain, and how such a move could be facilitated.

The perspective of governments is usually different from that of producers. When moving from the export of logs to the export of plywood, these perspectives can coincide: companies that are large log producers may well benefit from processing more of their logs themselves. However, in the case of furniture, even if improving their share in timber industry exports makes sense, in general plywood companies are not well placed to become furniture exporters. It is a completely different business, and it is doubtful whether they would have much of a comparative advantage. Governments, eager to stimulate the furniture sector (and other value-added sectors such as mouldings), might therefore wish to stimulate smaller, more specialized companies to expand their operations in this area.

Whether or not changing the nature of their end-product makes sense for producers depends on their particular conditions. For example:

- (1) plywood used for interior decoration has to be laminated (ie covered with a layer of fancy veneer, paper or plastic). One way for a plywood mill to increase value-added is to laminate the product rather than sell it in its 'raw' form to laminating plants. However, this strategy has limitations because not all plywood is of sufficiently good quality for laminating (normally, one-third or less is of the required quality). Moreover, there are two major drawbacks to selling laminated plywood rather than raw plywood. Demand for laminated plywood is fashion-sensitive: preferences for colours and patterns can change relatively quickly. Laminating plants therefore have to be close to the consumer markets in order to be able to react quickly to changes in demand. A shipping time of four to six weeks from the producer of the laminated plywood to the distributors is too long; this more-or-less rules out the possibility of Southeast Asian plywood producers moving into this market in any significant way. Further, in order to meet the

demand from distributors, producers need to keep an inventory of all the types of laminated plywood and the further away they are from the consumer market the larger the inventory has to be and the larger the risk that part of the stock will be slow-moving. Several of the large Southeast Asian plywood manufacturers have looked into this possibility and have found it preferable to sell normal plywood to the consumer markets, where they are laminated in specialized plants. Moving into laminated plywood is therefore likely to make sense only for plywood companies that are in major consumer markets (eg Chinese producers) and are of a relatively small size that allows them to respond quickly to changes in consumer demand;

- (2) the availability of inputs creates economic constraints on value-adding. For example, it may be too problematic for a plywood company to buy small quantities of logs of individual species (eg cherry, red peach) to produce the face veneer for higher-value plywood. To give another example, producing blockboard can be a viable proposition because markets are relatively more stable than for plywood; moreover, the blockboard panel can be sawn from the central part of the log left after peeling, allowing full use of the log. However, the more efficient the peeling method, the smaller the diameter of the log left after peeling, making blockboard production less viable. Moreover, it may not make sense for a plywood company to buy sawnwood in order to produce more core material for blockboard; and
- (3) all the value-added products have relatively limited markets – a large plywood company can only convert a small part of its end-product into, say, containerboard or concrete panel.

Nevertheless, even if most large plywood producers continue for a long time to sell most of their plywood in a 'raw' form, it makes sense for the industry as a whole as well as for individual plants to explore viable ways of moving up the value-added chain. Four issues may merit consideration:

- (1) it has been found in the past that research into new uses of plywood can be successful. For example, the use of specialized cryogenic plywood in liquified-natural-gas containment tankers is the result of research efforts by the industry. As one of the international commodity

bodies recognized by the Common Fund for Commodities, ITTO has access to the Second Account of the Common Fund, which supports efforts for diversification in the commodity sector. If they meet certain conditions, proposals submitted by ITTO for research projects into new plywood end-uses can be funded partly by the Common Fund. ITTO could work with plywood companies and industry bodies to formulate such proposals;

- (2) producers may wish to explore how they can enter into supply-chain alliances with importers and wholesalers. Under such arrangements a producer can, for example, pre-position a range of plywoods in a warehouse in the importing country, from which fast deliveries can be made. If the producer has sufficient capacity to provide after-sales service, it can then also bypass importers and sell directly to wholesalers, taking a larger share of the sales margin in the process. This strategy has been followed successfully by a number of Brazilian softwood plywood exporters;¹⁶
- (3) specialty plywoods and, in some markets, also standard plywoods can be branded (this latter is the case where consumers feel the need for some form of quality assurance). For example, Indonesia's Korindo Group has had success in China with its 'Butterfly' brand. To have a brand-name plywood means that one's buyers can be confident not only of the quality of the product itself but also of the quality of the service provided by the producer. Further, the buyer will have similar confidence, making it easier for him to rotate his stocks fast. Although the resulting price premium may be quite small, branding could make the buyers somewhat more faithful to a particular producer. Demand for brand-name plywood, then, will become more price-inelastic than that for 'nameless' plywood; and

¹⁶ A group of eleven pine plywood exporters representing two-thirds of the country's pine plywood production "in a fight back against what they claim are unscrupulous middlemen and speculators", formed a joint venture, 'Brazilian Forest Products'. With a base and port storage in the Netherlands, the company acts as the producers' own distributor in Europe. Reported in "Brazil trades on its plywood strengths", *Wood Based Panels International*, 17 July 2001.

(4) internet-based B2B exchanges can be a tool to shorten the supply chain, bringing producers and consumers in direct contact. B2B exchanges in the plywood sector are still in a rather underdeveloped state but their importance could increase if they develop clearing-house mechanisms (which enable buyers and sellers to eliminate the counterpart risks that normally would come from trading with new and unknown parties). This would have most influence on trade into relatively unknown destinations (for example, African importers could order relatively small volumes directly from Southeast Asian producers) and in more specialized products (smaller plywood companies are the ones most likely to benefit from this). While the current state of B2B plywood exchanges does not allow this potential to be realized, this may change soon and plywood producers may find it advisable to monitor developments in this regard.

Developing a more organized marketplace

The prices at which plywood actually trades are not registered publicly. In the past, APKINDO dominated the market and all market players could use APKINDO's published guide prices as the starting point for their negotiations. Now, it is impossible for producers and consumers to benchmark their prices to some objective reference price.

Transparent pricing mechanisms allow more predictable responses to changing demand and supply conditions, and reduce market volatility. They provide a reliable barometer of market conditions, freeing producers and consumers from the need to react too strongly to changes in supply/demand conditions. There are, in principle, two mechanisms for creating a transparent price. The quality of price reporting can be improved with more reliable and more timely price information being provided to the market by national or international entities. In addition, market transparency would also be improved if a tropical plywood futures contract were introduced.

In a plywood futures market, futures contracts for several delivery months would be quoted – eg in the month of January, contracts for delivery in March, May, September, December and March

of next year could be traded. Both those active in the plywood market and others could buy and sell contracts for these different months. Normally, the intention of such traders would not be to make or take delivery on the exchange. Instead, they would use the market either to speculate (that is, to try to anticipate price movements correctly, thus making a profit) or to hedge (take a position that gives them a risk exposure that is opposite to their risk exposure in physical trade). A producer who is exposed to the risk that plywood prices could fall in the future can hedge by selling futures contracts and, if prices indeed fall, generate a profit that will offset his lower prices. But while delivery is uncommon, the fact that it is possible will ensure that the physical and futures markets run more or less in parallel. If the prices on the futures market are too high relative to the underlying physical plywood market, plywood producers will sell futures and deliver physical plywood against them. This will lower the futures market prices and increase physical market prices and vice versa, with plywood buyers taking delivery from the exchange if futures prices are too low.

The futures market, then, will be a good barometer of the underlying physical plywood market. The prices at which the nearest futures contract trades will usually reflect the actual supply and demand situation on the physical plywood market or, to be more accurate, the market where the exchange's delivery points are located. If these delivery points are sufficiently representative of the wider national or international market, futures prices would then be representative of these wider markets as well.

A futures market has the advantage over a simple price reporting system in that it leads to 'immediate' price discovery (a price information system gives price levels only at the end of the day, or the next month). Such a futures contract could be traded through an electronic format or through an 'old-fashioned' exchange. China would seem a good choice for the creation of such a mechanism, as the country is now the world's second-largest consumer of tropical plywood and its third-largest producer and exporter. The two largest producers, Indonesia and Malaysia, are not major consumers, while the major consumer, Japan, has seen its production fall strongly over the past decade, and its exports are insignificant. So China is the only country where a plywood futures contract would attract a wide cross-section of the industry.

Plywood futures were once traded on one of the predecessor exchanges of the SFE. Reintroducing a plywood futures contract in Shanghai would help the development of the city as an international financial centre, and would also provide strong support for the orderly growth of the local plywood sector. It would provide China's plywood sector with an invaluable tool for price discovery and price risk management. Plywood companies from other Asian countries would undoubtedly also wish to use the exchange (as long as Chinese regulations

allow them). With China's accession to World Trade Organization, this could perhaps be one concrete expression of China taking a more prominent role in the world economy. Given the large benefits for the tropical plywood industry of having a price reference and risk management tool, ITTO could consider providing assistance to the SFE in its interactions with the plywood industry. If the SFE seriously considers the reintroduction of a plywood futures contract, ITTO could give it a forum at one of its regular Council sessions.

Annex 1

The role of tropical plywood in the wood-based panels sector

World wood-based panel production is increasing. According to estimates by the Food and Agriculture Organization of the United Nations, it reached 174.2 million m³ in 2001, with particleboard accounting for 45% of this and plywood 32% (see table A1). More than 100 countries produced wood-based panels, with the US accounting for almost one-quarter of total production and China more than 10%.

The wood-based panels group of products includes four main types of panels in two sub-groups¹⁷:

- (A) the 'natural wood panels', characterized largely by the wood species used, of which there are two types: 1) veneer; and 2) plywood; and
- (B) 'reconstituted wood panels', manufactured from different types of wood waste bonded together with resins or other binding substances and pressed together to form panels: 3) particleboard, including oriented strandboard (OSB); and 4) fibreboard (fibre building board), including medium-density fibreboard (MDF).

Normally, a distinction is made between *structural panels*, which are used in building construction (such as concrete formwork, exterior siding and panelling, sheeting, roofing and flooring), and *industrial panels*, used in various industrial applications, especially furniture production, joinery, packaging, transport and audio-visual industries.

Veneer sheets are thin sheets of wood of uniform thickness (usually not exceeding 5 mm) that are peeled, rotary cut, sliced or sawn for use in plywood, furniture, etc. Nowadays, logs can be peeled down to a core barely thicker than a broomstick. There are two types of veneer sheets: *plywood veneers*, which are generally produced by a peeling process from the more common species of wood and used for plywood production (therefore, in statistics, the production of these veneers is not counted separately); and *decorative veneers*, which are produced by slicing or sometimes by sawing finer, highly grained woods and are used mainly in the furniture and wood-

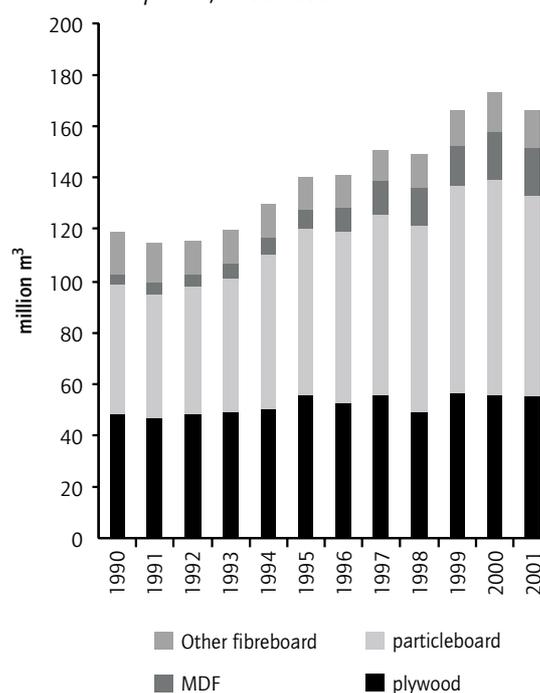
panelling industries. Decorative, or fancy, veneer is normally produced by small, specialized mills in thinner sheets than plywood veneer, and is sold at a higher price.

Table A.1: Production of wood-based panels (millions of m³), 2001

	North America	Europe	Asia	South America	World total
Veneer	0.6	1.8	2.7	2.7	8.0
Plywood	18.8	5.9	27.3	1.7	54.9
Particleboard	27.1	37.8	8.8	2.8	78.2
Fibreboard	8.2	13.2	8.2	1.8	33.1
Of which MDF	3.3	8.9	4.1	1.0	18.6
Total wood-based panels	54.6	58.8	46.9	8.0	174.2

Source: FAO Forestry statistics. The figures for particleboard production include OSB, production of which was over 20 million m³ in North America, and 1.6 million m³ in Europe

Figure A.1: World Production of wood-based panels, 1990–2001



Source: Based on FAO forestry statistics

Plywood is produced from three or more thin sheets (always an odd number) of veneer, which are joined by an adhesive with the wood grain direction of each ply (or layer) at right angles to the adjacent one, to increase strength. The quality of the inner layers (the core) does not need to be very high, but the face material generally has to be of a high

¹⁷ Based on the definitions in the report *Wood-Based Panels, a Study of Major Markets*, International Trade Centre (ITC) UNCTAD/WTO, Geneva, 1987, P. xii–xvi.

quality and the back material should also be of a sufficiently high quality. The proportion of high-quality veneer produced in the log-peeling process depends to a large extent on the type and diameter of the logs used, which implies that a plant's ability to produce thin plywood is compromised by poor log availability.

In the case of *lumber core plywood* (or *blockboard*), the core (that is, the central layer, which is generally thicker than the other plies) is solid and consists of narrow boards, blocks or strips of wood placed side by side, which may or may not be glued together. Blockboard does not have the structural strength of plywood of an equal thickness, so it sells at a lower price; however, as the core material is produced from the leftover material of the log after peeling it (which is too thin for further peeling), its production can still be profitable. *Cellular board* is plywood with a core of cellular construction, while *composite plywood* is plywood with the core or certain layers made of material other than solid wood or veneers.

Plywood can be made of hardwood or softwood logs. Softwood plywood (also called coniferous plywood) is mostly produced in North America and Europe. Most hardwood plywood is tropical plywood, but some is produced in temperate zones. It is also possible to produce plywood with a softwood core and a hardwood face and back.

Particleboard is the trade name for panels manufactured from small pieces of wood or similar materials (eg shavings, chips, flakes, splinters, strands, shreds, shives, sawdust or other wood waste) agglomerated with natural or artificial resins or organic binding substances and pressed together in the form of sheets, blocks, etc. Particleboard is also frequently overlaid with veneer, or laminates of printed-paper, foil, and so on. One type of particleboard that has been growing rapidly in

importance is OSB, which is made of several layers of long-fibre wood particles (strands) arranged successively at an angle and glued together, which gives great strength. OSB is used mainly in building construction and where high resistance is required, but it does not have plywood's resistance to outdoor exposure. In the US, OSB has driven out plywood in many construction and renovation applications. It can be produced with little labour and from cheap raw materials, including the so-called weed species, which are in ample supply close to major consumption areas.

Fibreboard is usually manufactured from woodchips that have been mechanically defibred or steam-exploded or from other defibred ligno-cellulosic materials which are bonded together in the form of panels, either compressed or non-compressed. Depending on the degree of density, the board is traditionally referred to as *hardboard* (compressed), or *softboard* or *insulating board* (non-compressed); this latter category includes MDF. MDF is a fairly recent innovation, developed originally in the US and Canada, which is making rapid inroads in many other countries (Malaysia is now a large exporter). Produced from products otherwise unsuitable for panel production (eg rubber tree scrap), MDF is mainly used in furniture, replacing sawnwood as well as plywood and particleboard.

While some of these types of wood-based panels have specialized end-uses, many, especially the new panels, are functional substitutes: at least for some applications, processors can shift from one type to another, if and when the price is right. For example, OSB, while competing most strongly with sawnwood, is challenging structural grade (thick) plywood within the construction industry, while MDF is competing mainly with particleboard, but also with thin plywood, in furniture production.

Annex 2

Online industry and market information sources for the tropical plywood industry

General industry information

The International Tropical Timber Organization, www.itto.or.jp, covers, inter alia, production and trade in (tropical) plywood, and provides regular reports and statistics on the sector, including in its annual reports. It also produces special reports on a range of issues, and its quarterly *Tropical Forest Update* regularly contains one or more articles relevant to the plywood industry. It also provides fortnightly market information (including prices for some major types of plywood in several countries – Brazil, China, Ghana, Indonesia, Japan, Malaysia, Peru and the UK) in its *Market Information Service*; back issues are accessible on its website. ITTO also provides historical price information in its annual reports.

The UN/ECE Timber Committee, www.unece.org/trade/timber, covers the production and trade of timber and timber products (including wood-based panels), with a particular focus on Europe and North America. It analyses market trends, makes market forecasts and provides statistics. Among its publications, available online, is an annual forest products' market review.

The FAO Forestry Division, www.fao.org/forestry, provides information about the worldwide forest industry, including country profiles (which cover the plywood sector, where relevant). FAO also produces 'outlook studies' which explore likely future changes in the nature and type of wood supplies and trends in processing.

The World Forestry Institute, <http://www.worldforestry.org/wfi/trade-1.htm>, provides an overview of world forest products' trade.

Other country-specific information

The Foreign Agriculture Service of the United States Department of Agriculture, www.fas.usda.gov, offers information on forest products (at www.fas.usda.gov/ffpd/fpd.html), including attaché reports covering country-specific developments in the 'solid wood products' market

(which includes plywood). Annual reports are available for some 33 countries, including Brazil, China, Indonesia, Japan, Korea, Malaysia and the United Kingdom.

Wickes Inc, a large US building materials' supplier (not related to Wickes Building Supplies in the UK), provides a weekly market report covering the US markets for several wood panels (www.wickes.com/resourceLibrary/WoodUpdate.cfm). CC Crow's Publications, www.crows.com, supplies a daily price report that comprehensively covers North American lumber and wood-panels markets, as well as a weekly market overview. The various e-commerce sites mentioned in Box 2 (in particular, *Random Lengths*) also give plywood price and market information, with a focus on North America.

In the UK, Wood Based Panels International, www.wbpionline.com, reports on industry developments, with a focus on Europe and the USA.

The website of the Indonesian Ministry of Forestry, www.dephut.go.id, mostly in Bahasa Indonesia, offers information on forestry policies, including with respect to the plywood industry.

The Malaysian Ministry of Primary Industries provides an overview of its timber and wood sector at www.kpu.gov.my. The Malaysian Timber Council, www.mtc.com.my, provides much information about the industry, including statistical data, and (for Malaysian firms) regular market reports from its offices in Dubai, London and Shanghai.

Chinawood, www.chinawood.org/e, gives information on the Chinese timber market, including prices on a number of wholesale markets. Chinatimber, www.chinatimber.org/english, provides a similar range of information.

The *Japan Lumber Journal*, www.jlj.gr.jp, offers Japanese market news and prices, as well as an industry directory. The *Japan Forest Products Journal*, www.n-mokuzai.com, in Japanese, provides daily and weekly news, and also access to the English-language *Japan Lumber Report* (which covers plywood).

Sitio Madera, www.sitiomadera.com, a Chile-based website, gives worldwide information on wood-panel markets, with a particular focus on Latin America.



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