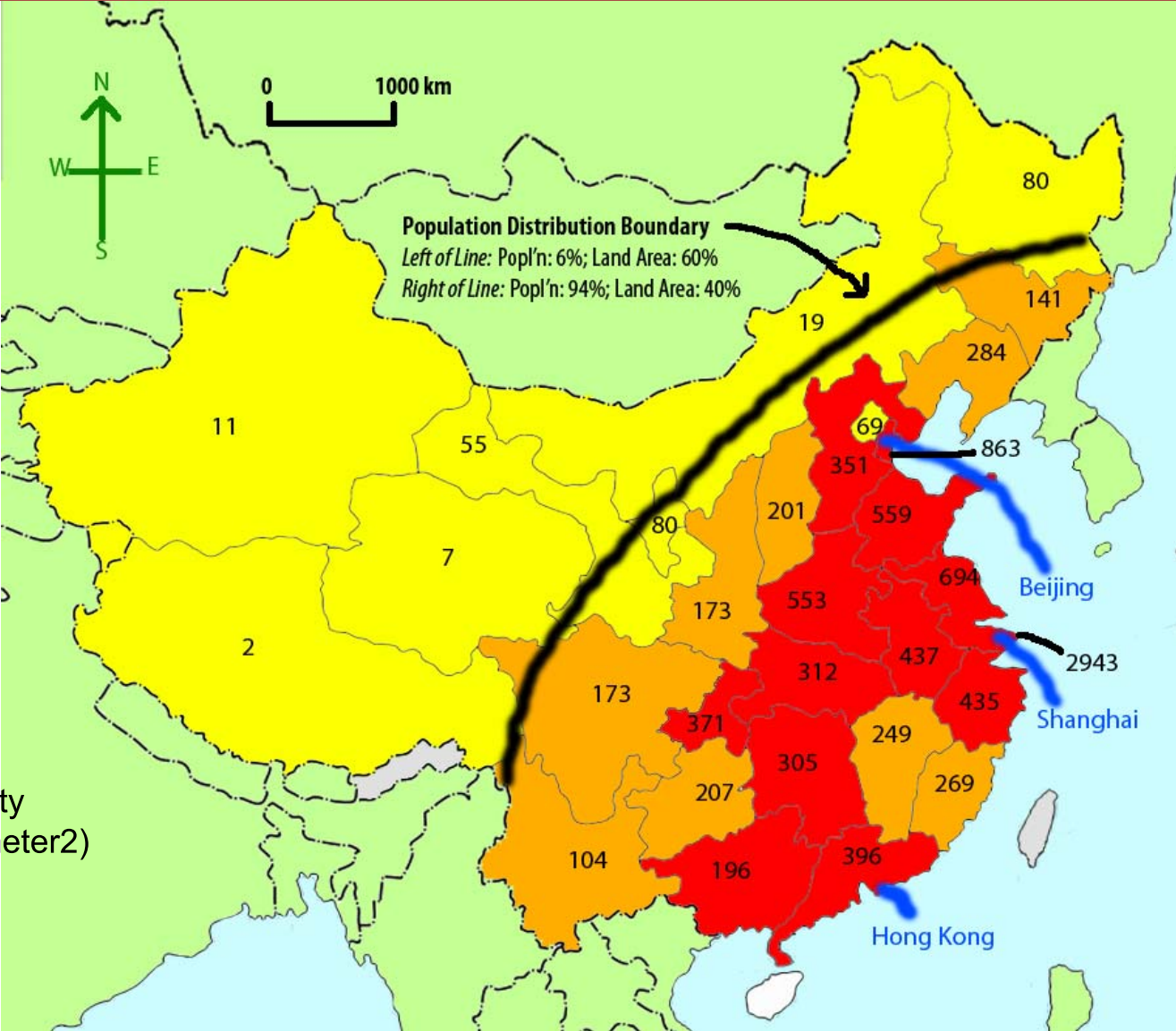


Change and Trend in the China Wood Panel Industry-Challenge and Opportunity to US Wood Panel Industry and Research

Dr. Frederick Kurpiel, Georgia Research Institute, Georgia
30269, USA

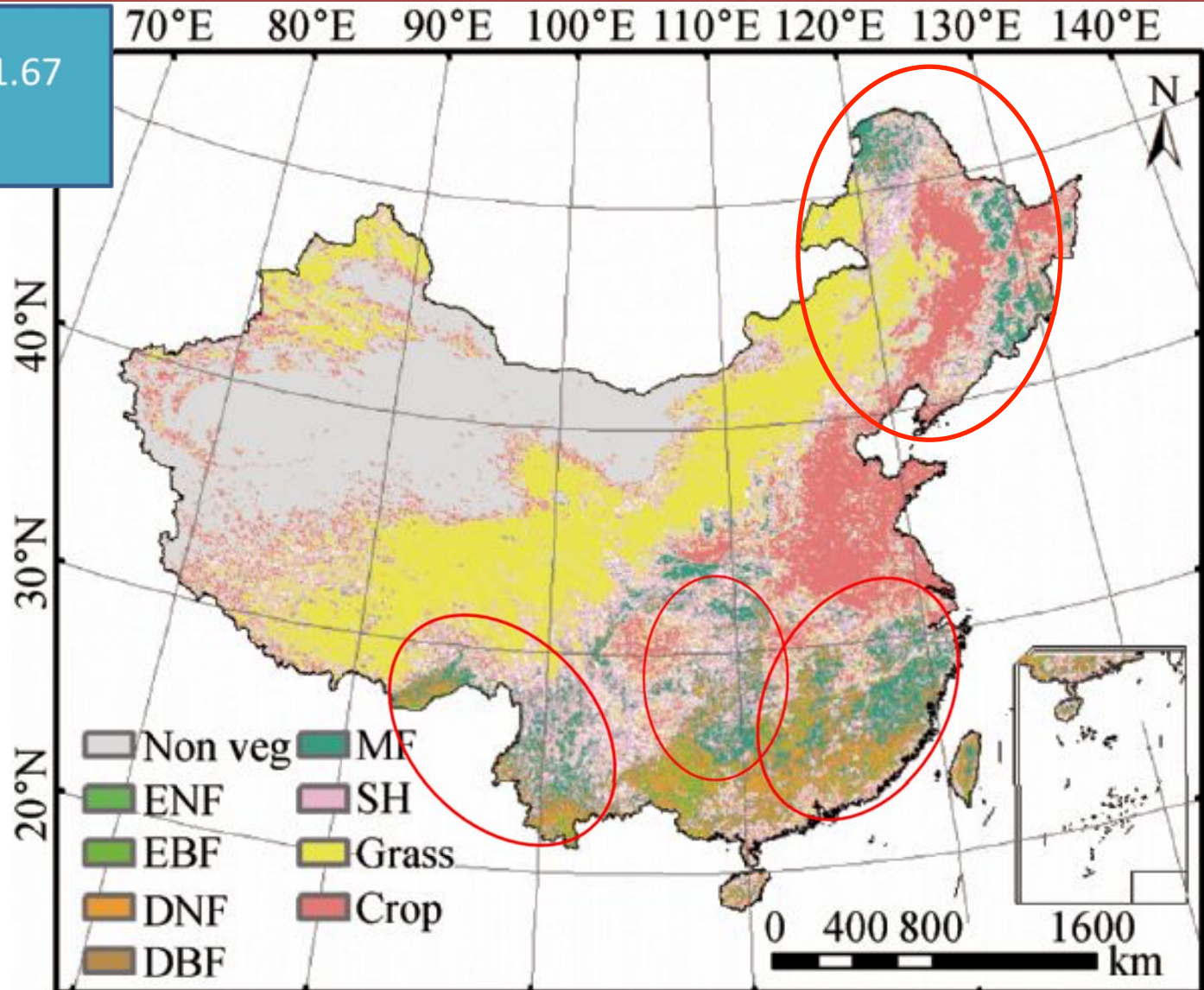
Dr. Hui Wan, Sustainable Bio-products Department at
Mississippi State University, Mississippi 39759, USA

Change in the China Wood Panel Industry



Change in the China Wood Panel Industry

- Forestry coverage: 21.67
- 4 Forestry areas



ENF: evergreen needleleaf forest
EBF: evergreen broadleaf forest
DNF: deciduous needleleaf forest
DBF: deciduous broadleaf forest
MF: mixed forest
SH: shrublands
Grass: grasslands
Crop: croplands
Non veg: no vegetation covered

Change in the China Wood Panel Industry

Forest:

- 193 mil. ha. forest (about 120 mil. ha. natural forest, 62 mil. ha. plantation)
- 21.67 % forest coverage rate
- 14.5 bil. m3 standing forest stock
- 13 bil. m3 forest storage (11 bil. m3 natural forest, 2 bil. m3 plantation)
- More than 7500 species -Deciduous: birch, poplar, oak, northeast China ash; - Coniferous: spruce, Chinese fir, larch, pine



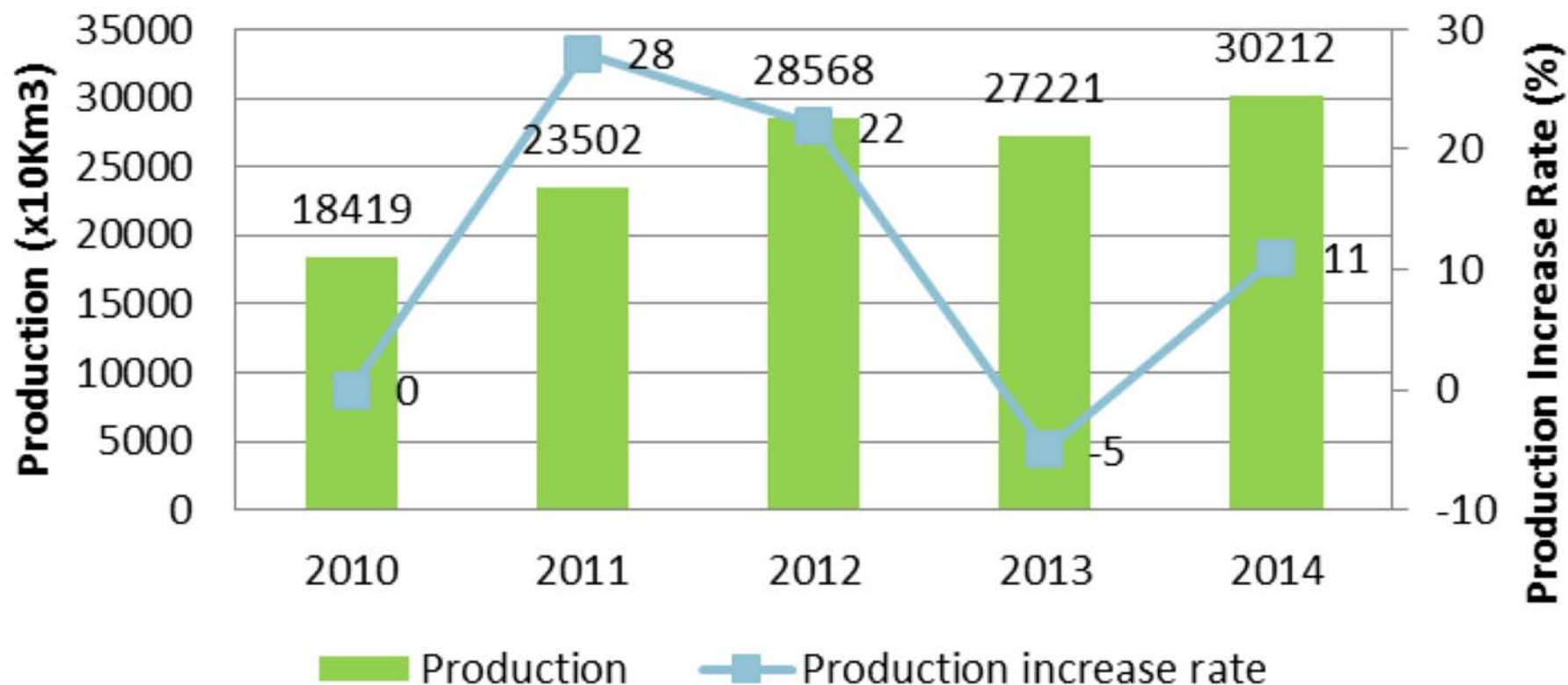
Change in the China Wood Panel Industry

Some facts:

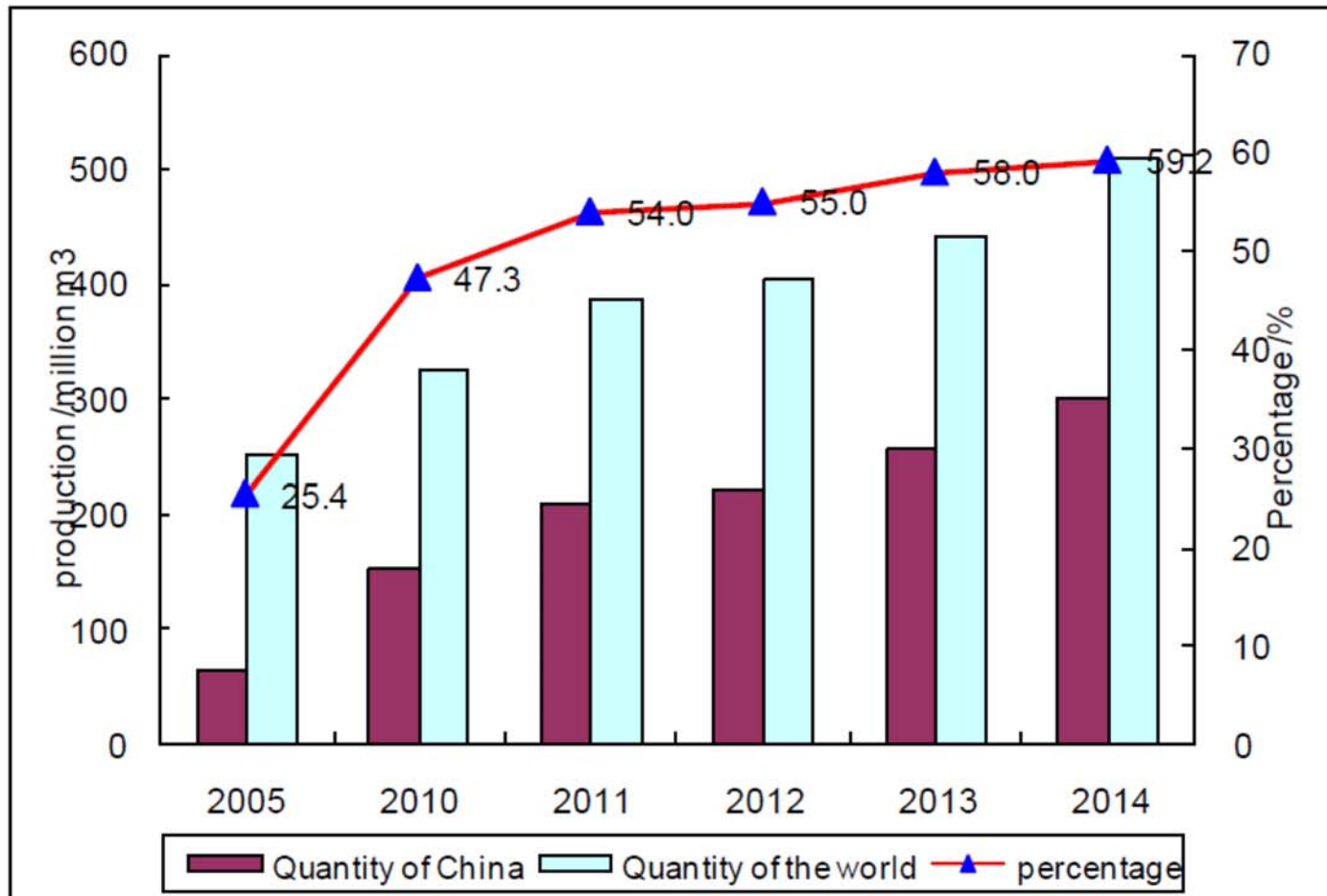
- The annual forest growth in China is more than 0.5 billion mu, while the annual cutting quota is 0.25 billion mu. With only 5% of world's forest resource, China produced 60% biobased panel of the world.
- 2014 gross production value of Chinese forestry industry was up to 5260 billion yuan or 11.1% increase over last year.
- 2014 Chinese trade value of forestry products (import & export) up to \$138 billion USD or 9.5% increase over last year.
- In China more than 10 thousand wood-based panel enterprises employ more than 3 million workers in 2014, yielded panels of 0.25 billion m³, and created production value of about 1000 billion yuan.

Change in the China Wood Panel Industry

2010-2014 Chinese Wood Composite Production



Change in the China Wood Panel Industry



Percentage of panels of China in output of the world (2005-2014)

Change in the China Wood Panel Industry



Hebei: production capacity: 9% of that of China; main commodities: plywood, particleboard

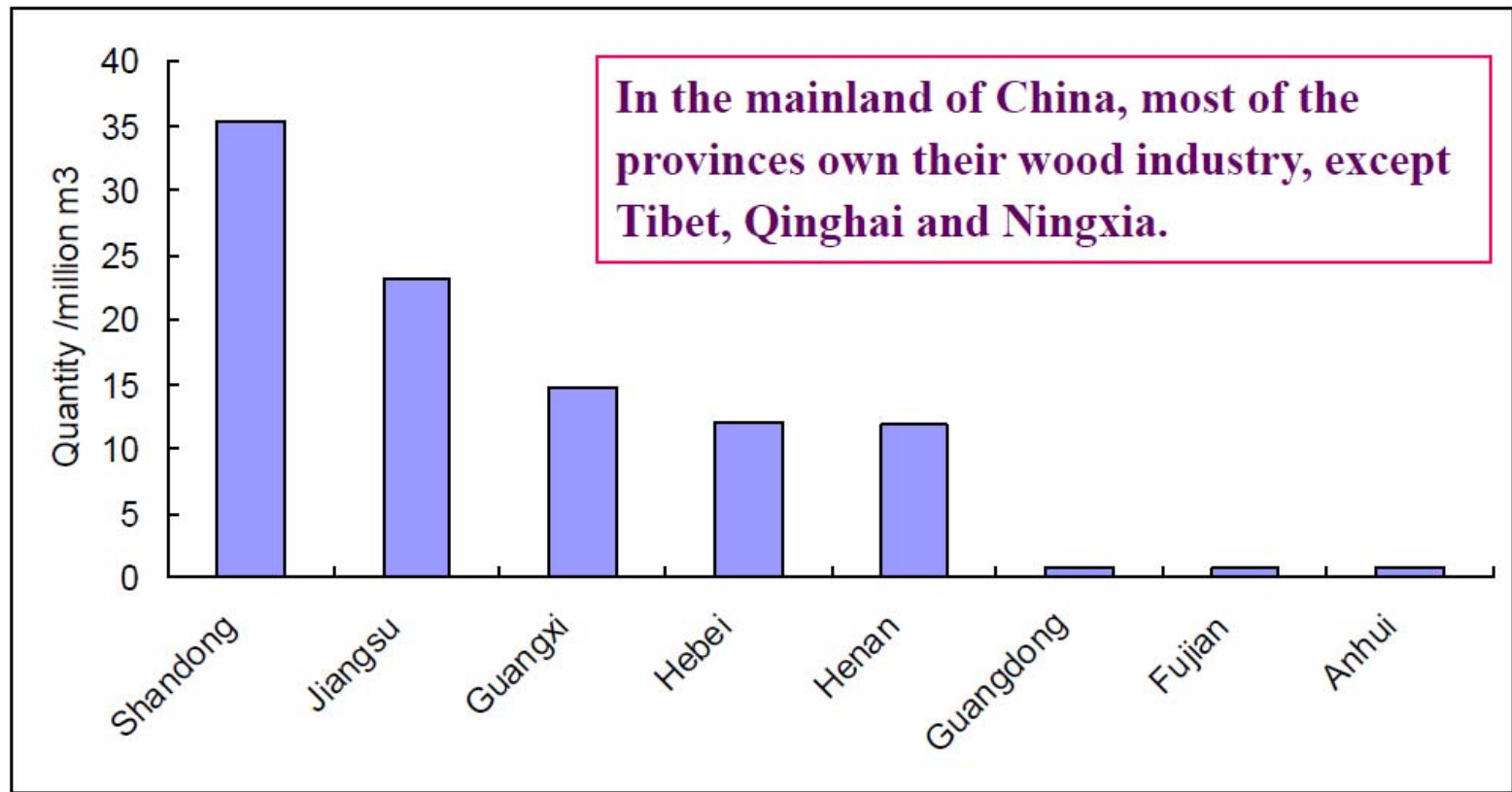
Shandong: production capacity: 11%; main commodities: plywood, MDF

Jiangsu: production capacity: 22%; main commodities: plywood, MDF

Fujian, Guangdong, Zhejiang, Guangxi: production capacity: 20%; main commodities: plywood, bamboo-based plywood

Change in the China Wood Panel Industry

Top 8 provinces for wood panel production



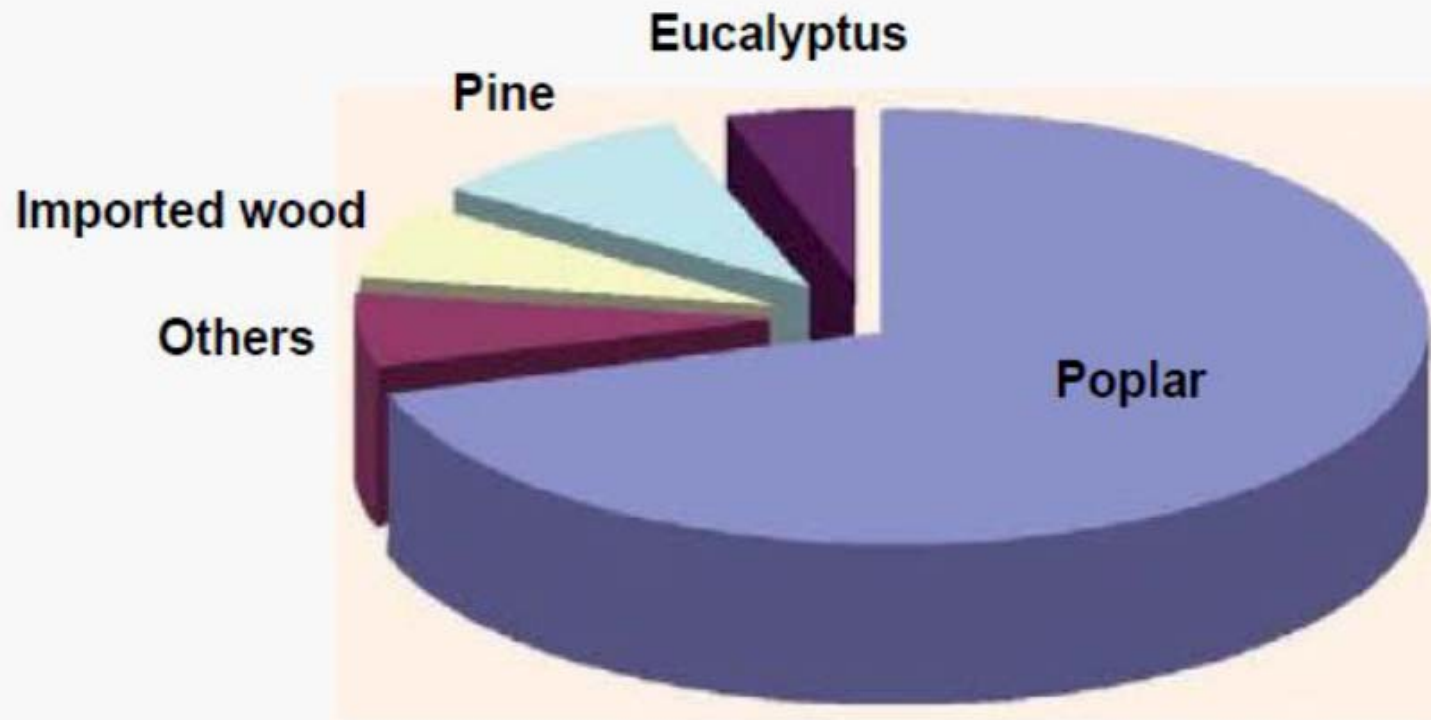
Change in the China Wood Panel Industry

Consume structure change of Chinese plywood during 1980-2013

Year	1980s	1995	2005	2013
Construction (%)	16	29	55	45
Furniture (%)	74	49	11	20
Packaging (%)	5	10	13	5
Transportation (%)	2	4	8	5
Decoration (%)				2
Floor (%)				20
Others (%)	3	8	14	3

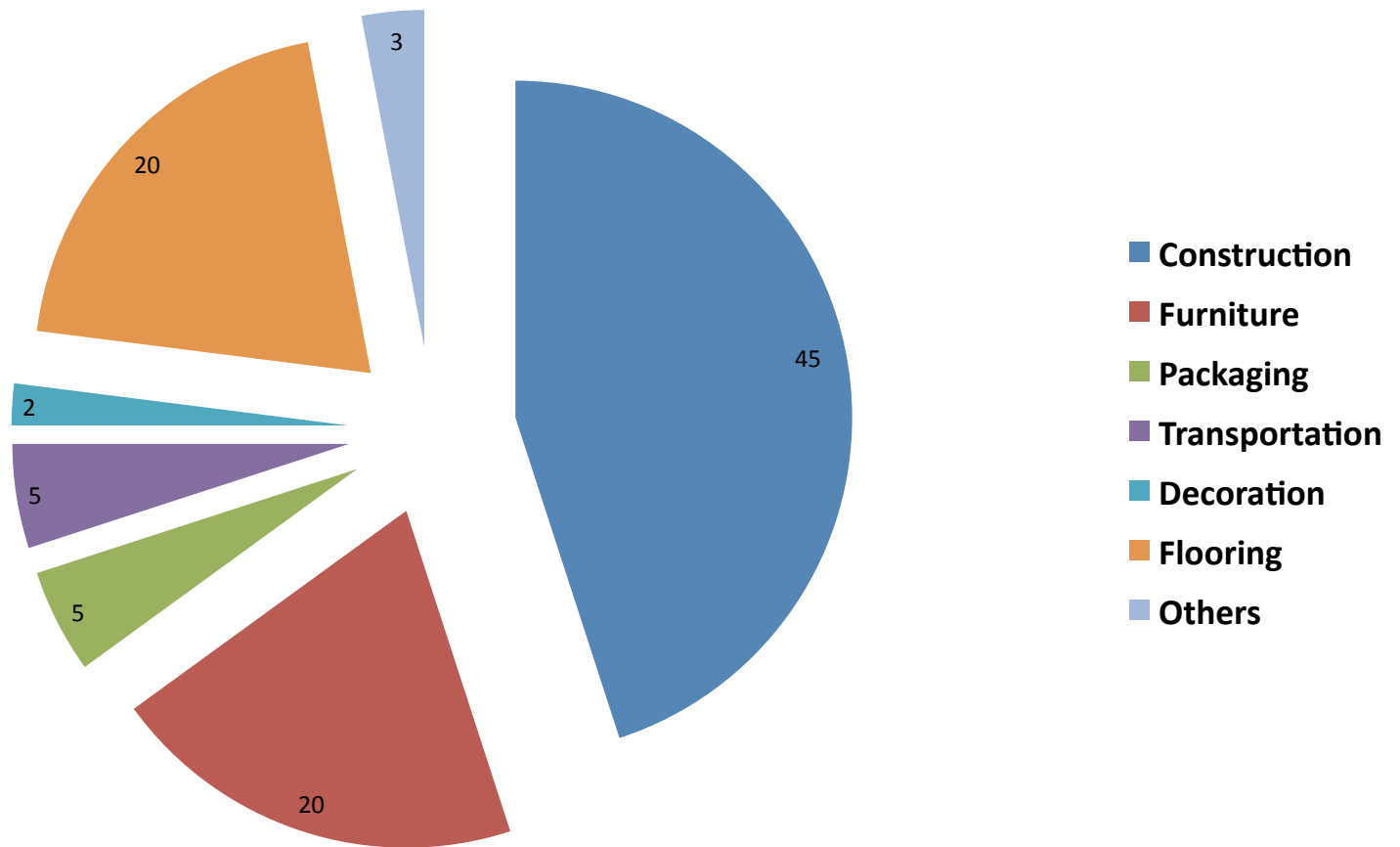
Change in the China Wood Panel Industry

Major Species for Plywood Production



Change in the China Wood Panel Industry

Plywood Application in China 2014



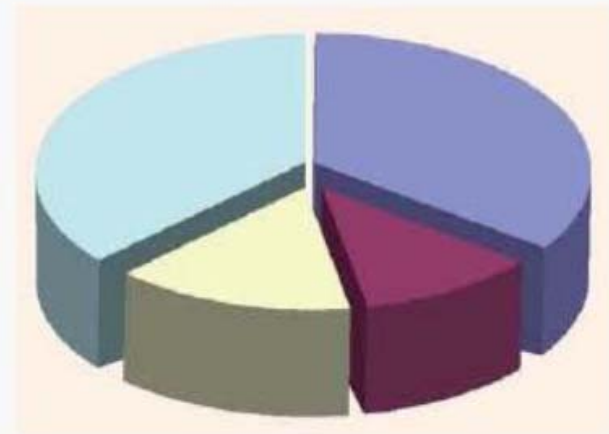
Change in the China Wood Panel Industry

Furniture Production in China

- Total output value: 135 Bil. USD (Guangdong accounts for 1/3)
- Production in 2010: 770 Mil. Pieces



Fig. 1 Furniture output of different provinces



- Composite panels 37%
- Non-wood materials 35%
- Solid wood with joints 16%
- Top-grade solid wood 12%

Fig. 2 Materials for furniture production

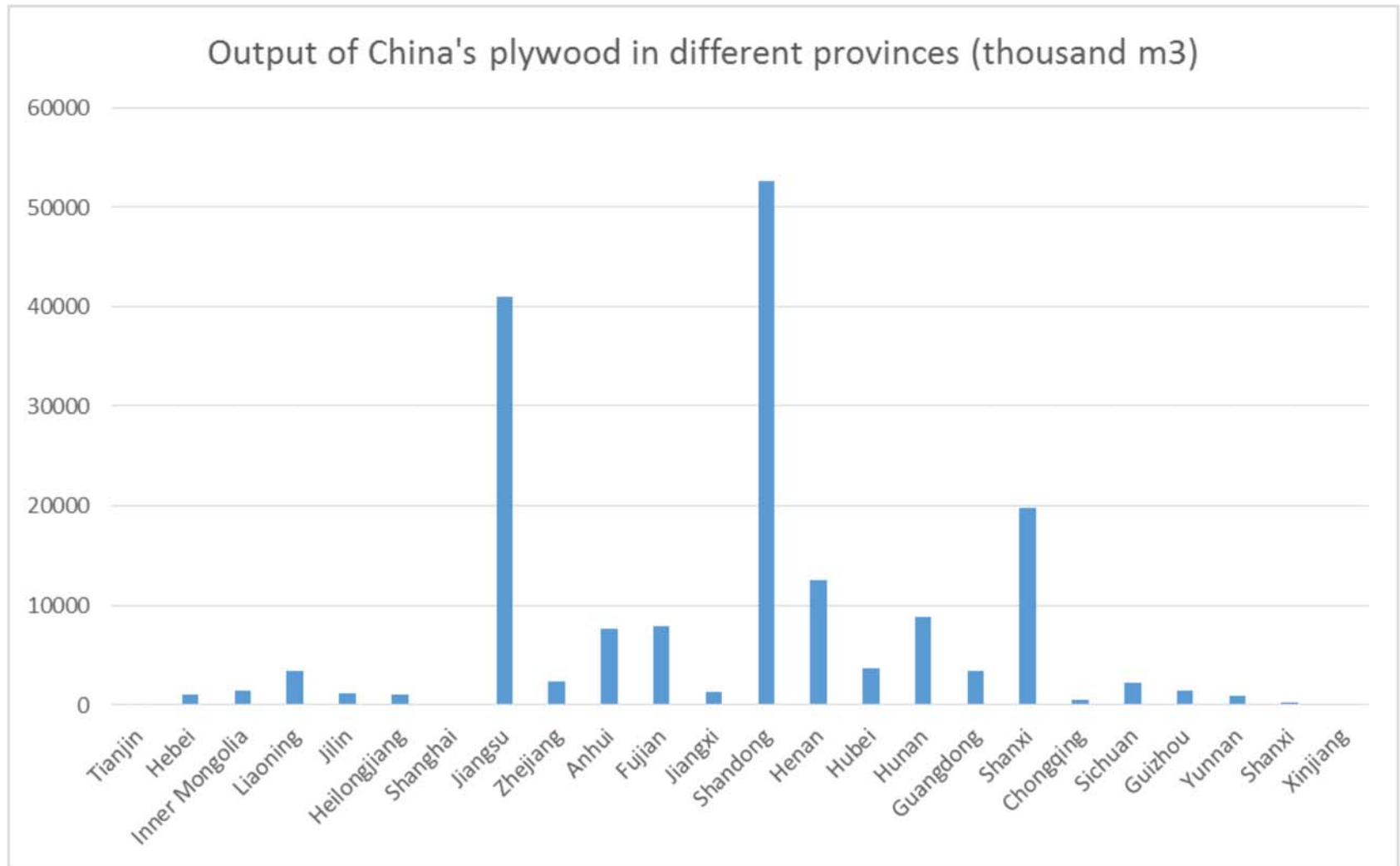
Change in the China Wood Panel Industry

Production, import and export volume of Chinese plywood during 2007-2014

Year	Production million m ³	Export million m ³	Import million m ³
2007	3.56	0.88	0.031
2008	3.5	0.72	0.029
2009	3.6	0.56	0.020
2010	7.1	0.75	0.021
2011	9.8	0.96	0.019
2012	11.0	0.91	0.016
2013	13.7	1.03	0.016
2014	17.2	1.3	0.018

Paradigm Change in the China Wood Panel Industry

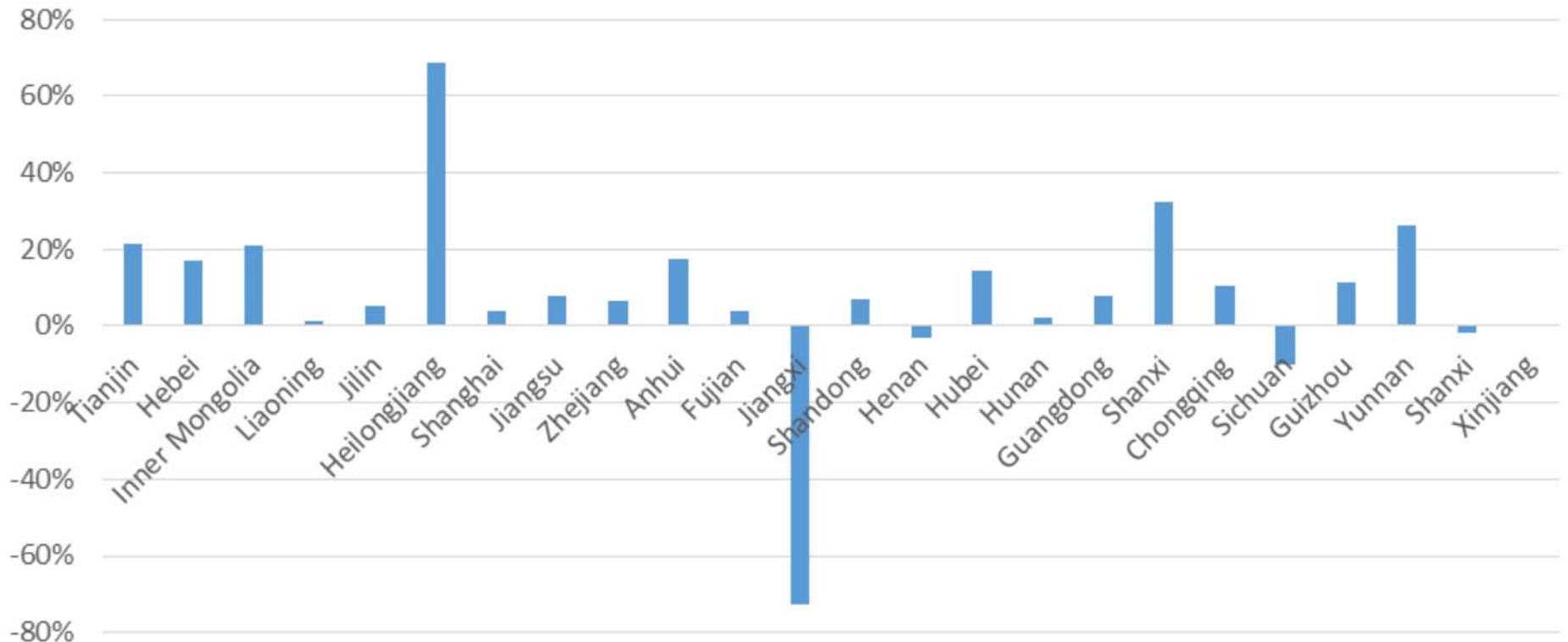
Plywood production of China in 2014



Change in the China Wood Panel Industry

Plywood production of China in 2014

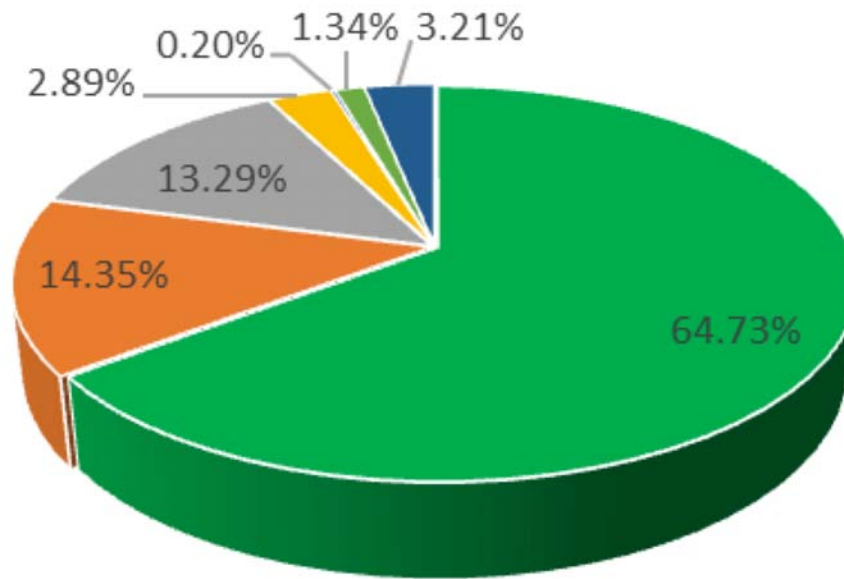
Province output increased compared with 2013



Change in the China Wood Panel Industry

Plywood production of China in 2014

Proportion of plywood production at the region of China



■ East ■ Middle ■ South ■ North West ■ South West ■ North ■ North East

Change in the China Wood Panel Industry

Plywood exports of China (x1000m3) in 2014

Country	2013	2014	2015					2015	2014	% Change			
	Annual	Annual	J	F	M	A	M	J	J	A	YTD	YTD	YTD
USA	1,338	1,679	208	118	66	214	184	152	168	134	1,244	1,102	12.9%
Japan	815	831	74	46	57	57	54	53	58	60	459	565	-18.8%
S.Korea	770	710	53	43	35	60	69	64	68	53	445	506	-12.1%
UK	585	718	93	71	40	79	61	69	42	44	499	448	11.4%
U.A.E	573	698	51	53	44	70	74	62	81	67	502	465	8.0%
Philippine s	401	678	66	49	18	46	65	51	55	45	395	518	-23.7%
S.Arabia	433	600	40	61	37	58	56	37	54	38	381	366	4.1%
Thailand	363	330	36	21	8	26	23	24	25	28	191	230	-17.0%
Taiwan	284	329	36	20	19	29	34	25	22	24	209	215	-2.8%
Vietnam	223	269	24	4	19	27	30	24	26	24	178	170	4.7%
Israel	285	267	28	17	7	29	33	25	26	18	183	172	6.4%
Singapore	228	230	28	11	11	19	20	16	17	17	139	152	-8.6%
Hong Kong	233	198	19	11	16	17	15	16	14	18	126	132	-4.5%
Others	3,732	4,268	358	290	162	319	359	316	318	303	2,425	2,866	-15.4%
Total	10,263	11,805	1,114	815	539	1,050	1,077	934	974	873	7,376	7,907	-6.7%

Change in the China Wood Panel Industry

Particleboard exports of China (x1000 m3) in 2014

Country	2013	2014	2015						2015	2014	% Change		
	Annual	Annual	J	F	M	A	M	J	J	A	YTD	YTD	YTD
Russia	66.1	64.3	1.2	1.2	0.2	1.0	0.8	1.2	0.6	0.3	6.5	44.5	-85.4%
Tajikista	29.6	26.5	1.7	0.2	0.1	0.1	0.3	0.2	0.1	0.1	2.8	14.2	-80.3%
Mongolia	39.7	55.9	3.5	1.7	3.5	5.3	5.4	6.4	4.2	5.5	35.5	37.3	-4.8%
S.Korea	9.8	16.5	1.5	1.2	1.0	1.0	1.1	1.2	1.4	1.0	9.4	11.9	-21.0%
India	3.7	16.4	6.5	1.9	0.2	1.1	0.8	1.3	2.5	2.3	16.6	4.0	315.0%
S.Arabia	8.5	9.6	1.8	1.1	0.2	0.4	0.9	0.6	0.8	0.3	6.1	6.3	-3.2%
U.A.E	7.0	13.6	0.7	1.9	0.7	1.2	0.7	1.0	2.3	0.7	9.2	8.9	3.4%
Others	97.2	164.9	13.8	11.0	5.9	10.6	11.8	14.9	11.9	10.2	90.1	111.6	-19.3%
Total	261.6	367.7	30.7	20.2	11.8	20.7	21.8	26.8	23.8	20.4	176.2	238.7	-26.2%

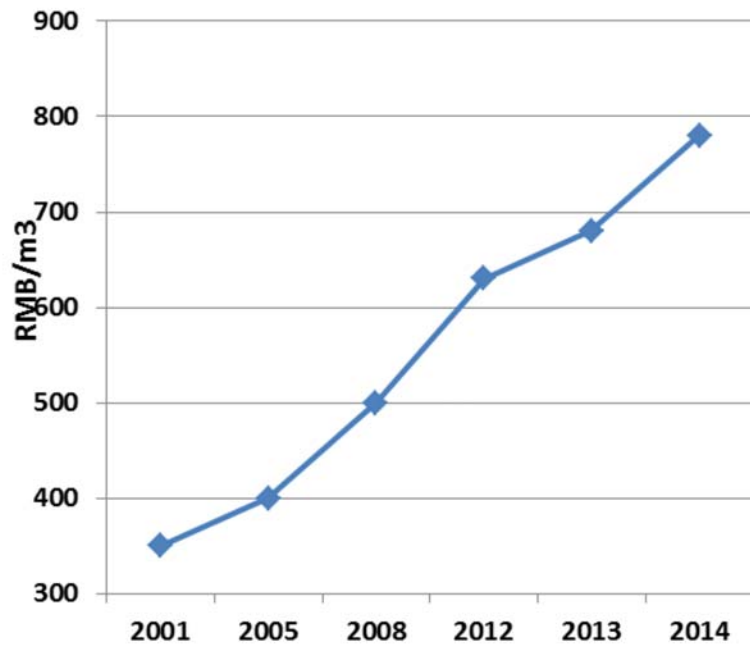
Change in the China Wood Panel Industry

Fiberboard exports of China (x1000 m3) in 2014

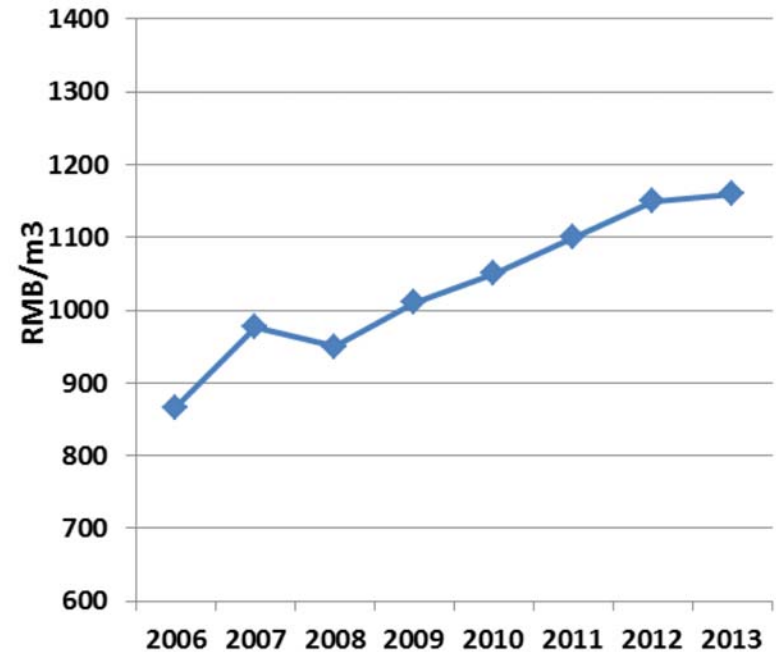
Country	2013	2014	2015						2015	2014	% Change		
	Annual	Annual	J	F	M	A	M	J	J	A	YTD	YTD	YTD
USA	630.4	652.4	66.2	36.7	22.7	45.7	50.0	41.1	48.6	48.1	359.1	419.1	-14.3%
Russia	449.2	495.0	18.5	20.1	6.9	6.4	9.4	14.6	17.1	17.0	110.0	346.6	-68.3%
Canada	255.9	276.5	20.6	15.6	7.1	13.7	12.7	12.1	16.6	14.7	113.1	176.8	-36.0%
Iran	244.0	221.0	41.9	12.9	18.3	59.1	51.0	17.0	23.9	26.1	250.2	128.8	94.3%
S.Arabia	197.0	293.5	37.4	19.7	23.4	23.9	40.9	35.6	34.3	26.7	241.9	175.4	37.9%
S.Korea	59.5	63.7	4.1	5.4	3.9	6.0	5.7	4.9	5.0	6.1	41.1	41.5	-1.0%
India	60.0	55.5	5.8	6.0	2.6	6.0	6.7	5.1	5.3	3.4	40.9	36.6	11.7%
Australia	54.0	59.0	5.2	5.1	3.1	6.3	8.0	6.1	8.4	8.0	50.2	37.6	33.5%
Vietnam	67.0	70.1	15.2	4.7	7.8	9.6	8.6	7.7	7.9	7.4	68.9	34.5	99.7%
Others	1,487.0	1,356.7	133.3	112.5	61.1	121.6	137.1	139.0	129.5	130.8	964.9	900.8	7.1%
Total	3,504.0	3,543.4	348.2	238.7	156.9	298.3	330.1	283.2	296.6	288.3	2,240.3	2,297.7	-2.5%

Change in the China Wood Panel Industry

China: Eucalyptus Log Price



China: Poplar Log Price

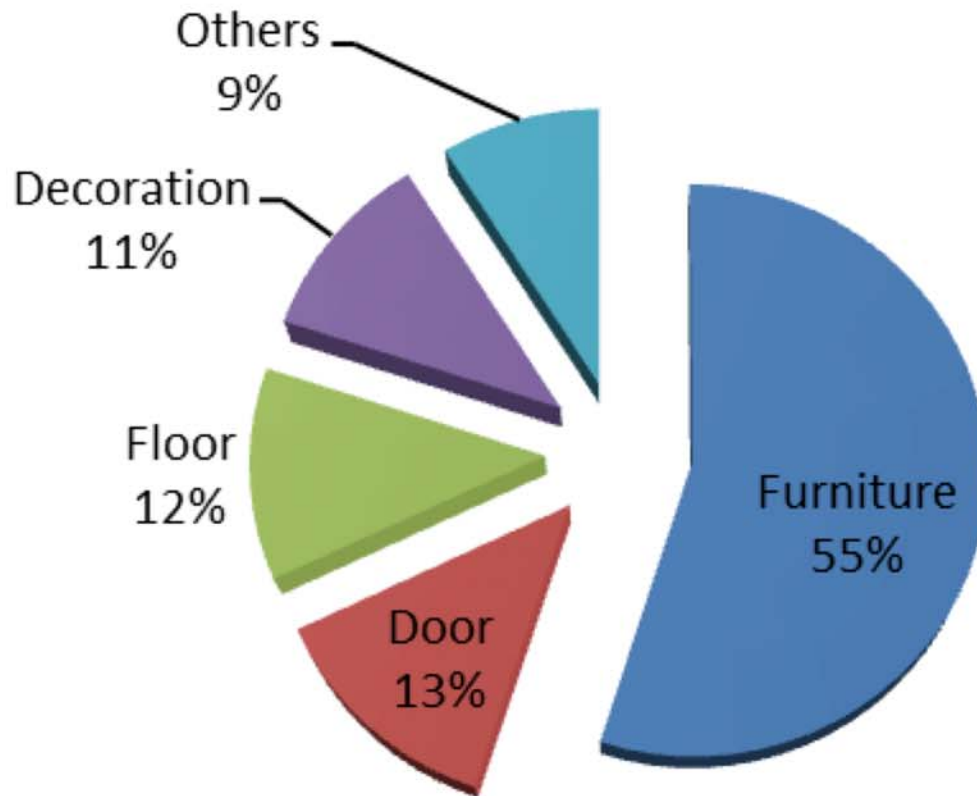


Change in the China Wood Panel Industry

Product	Production (x10000m3)	Application	Application ratio (%)	Amount (x10000m3)
blockboard	1800	Decoration	70	1260
Plywood	15740	Furniture	54	8499.6
		Construction	13	2046.2
		Package	8	1259.2
		Transport	14	2203.6
Fiber board	5983	Furniture	55	3291
		Door	13	778
		Floor	12	718
		Decoration	11	658
Particleboard	1357	Furniture	80	1086
		Construction	7	94
		Package	5	68
		Floor	3	41

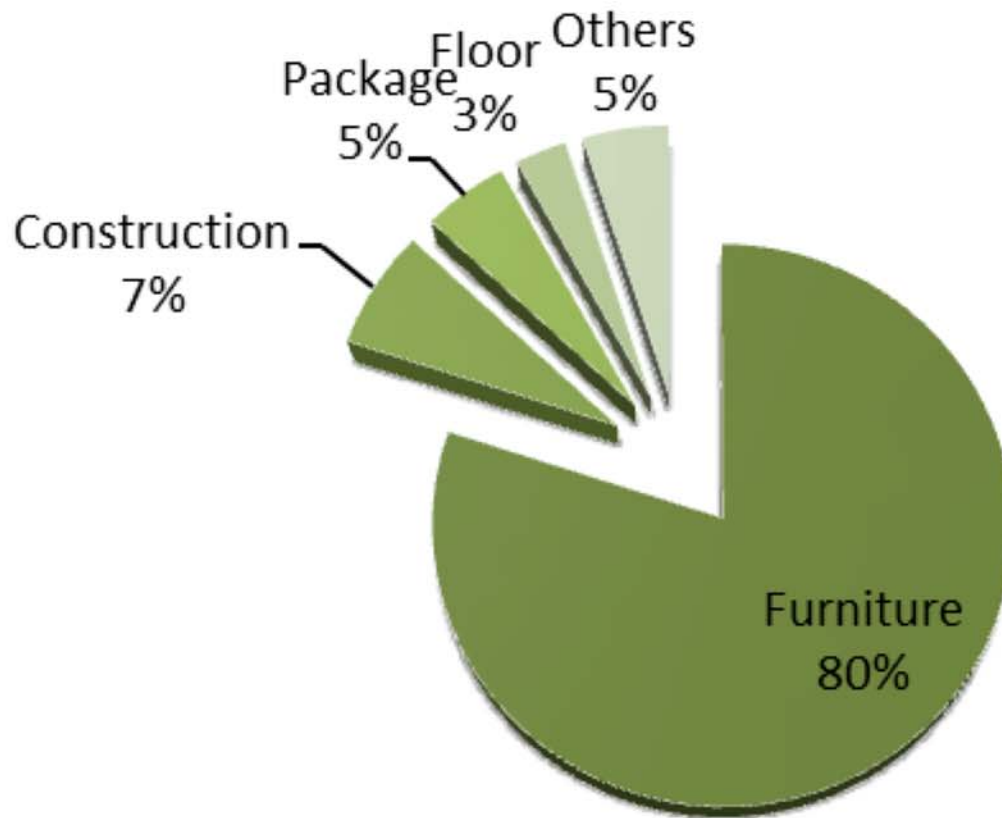
Change in the China Wood Panel Industry

Fiberboard Applications



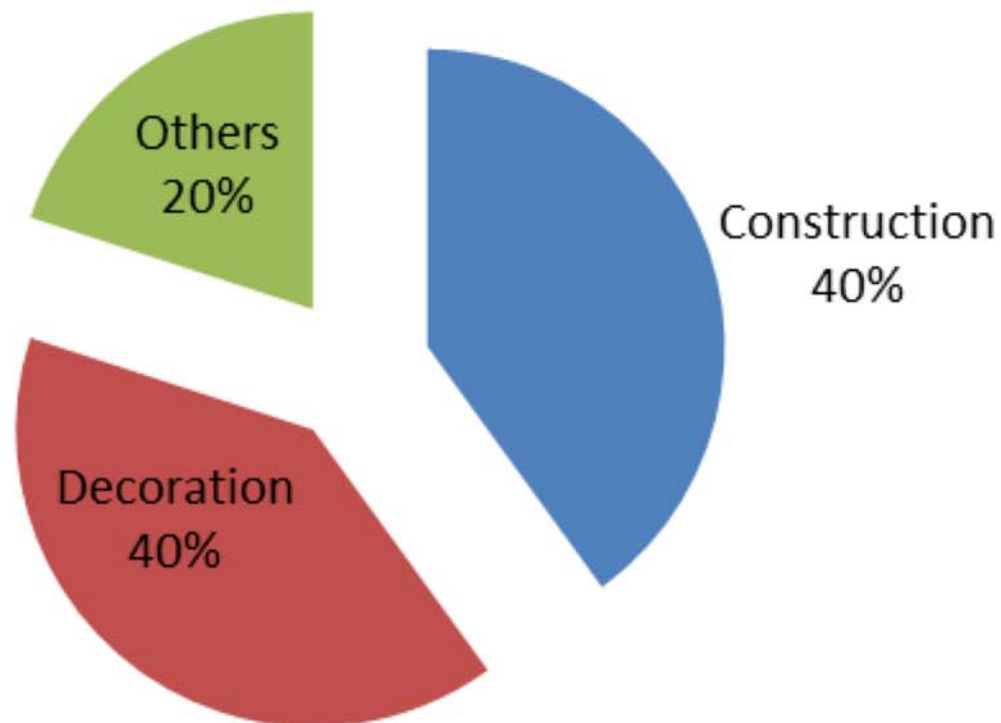
Change in the China Wood Panel Industry

Fiberboard Applications

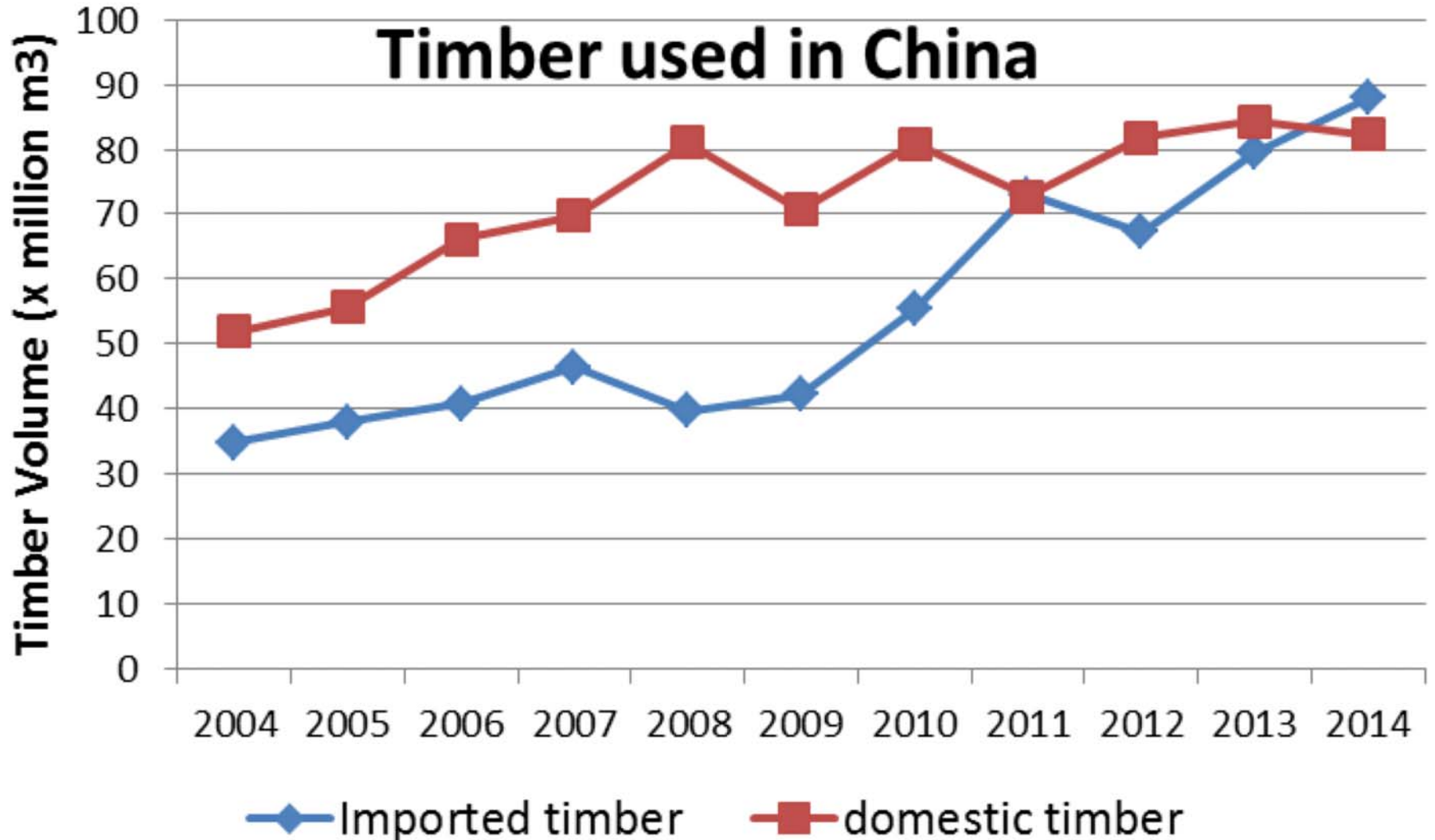


Change in the China Wood Panel Industry

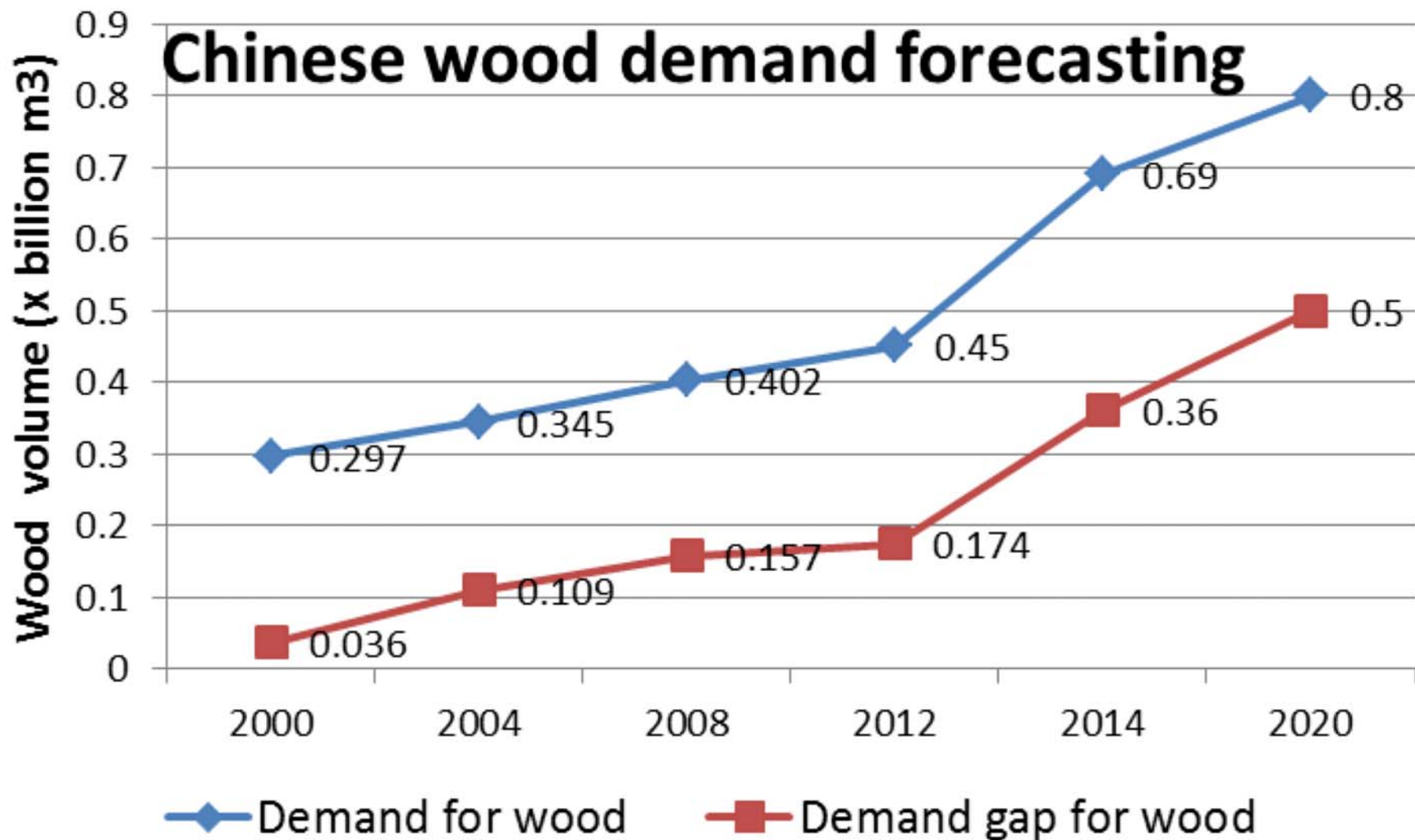
OSB Applications



Change in the China Wood Panel Industry

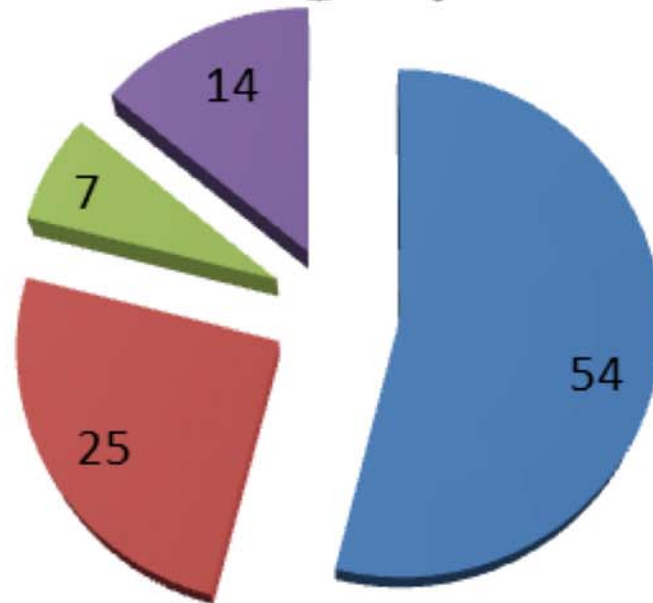


Change in the China Wood Panel Industry



Change in the China Wood Panel Industry

Chinese wood composite industry demographic



■ Plywood ■ Fiberboard ■ Particleboard ■ Others

Change in the China Wood Panel Industry

Rate of Chinese wood composite panels meeting the quality requirement

	2010	2011	2012	2013	2014
Plywood	88.5	89.9	89.9	87.6	97.1
MDF	76.3	81.5	90.5	90.7	93
PB	60.4	72	81.6	79.2	94.2
Blockboard	83.4	83	86.7	89.5	92.1

Change in the China Wood Panel Industry

	# of enterprise	Employment (million)	Employment (%)
Lumber	23406	153.13	12.40
Chips	12615	36.14	2.93
Plywood	10679	232.77	18.84
Fiberboard	1206	32.28	2.61
Particleboard	1461	83.41	6.75
Floor	2831	70.40	5.70
Chopsticks	1305	6.69	0.54
Decoration Panel	998	10.73	0.87
Veneer	22993	477.83	38.68
Others	7763	131.82	10.67
Total	85257	1235.19	100.00

Change in the China Wood Panel Industry

Main issues in China

- Small scale of enterprise; imbalance of regional development
- Scarcity of forest resource; high dependence on import
- Weak industry supervision; low product quality
- Lack of famous brand; Full of trade barriers
- Labor intensive; no comparative advantage
- Insufficient investment in scientific research; weak innovation ability

Change in the China Wood Panel Industry

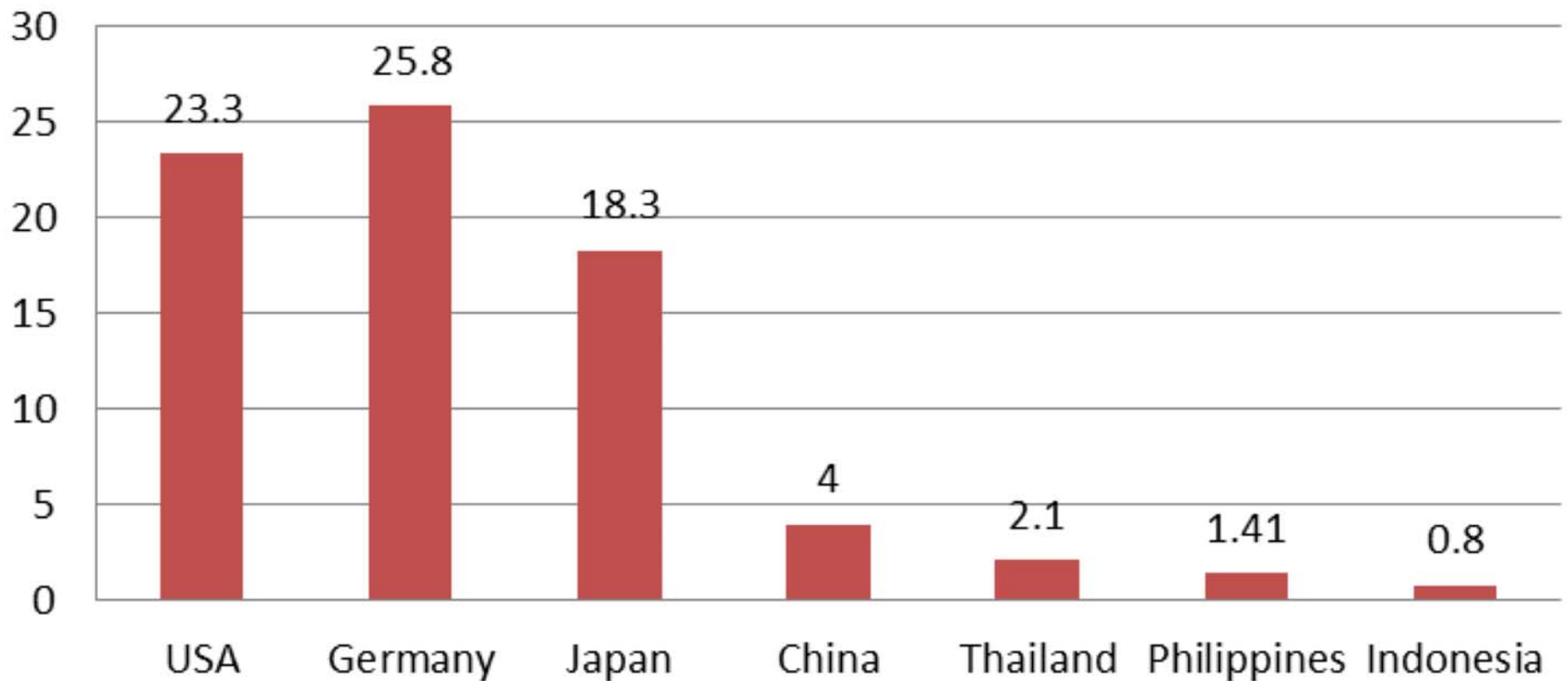
- Lack of technological innovation and equipment development industry are affecting the sustainable development of wood panel industry
- There is little technical content and weak innovation capacity for wood panel industry
- Scientific investing is deficient and the technology transfer is not timely
- Speed of upgrading production is slow
- Lack of hi-tech wood products talents

Paradigm Change in the China Wood Panel Industry

Listed Companies	Invest on R&D (million yuan)	The % in revenue		
		2014	2013	2012
Dare Technology Co., Ltd	205.82	2.44	2.51	1.84
Der Future Science and Technology Holding Group Co., Ltd	21.33	3.14	3.16	3.86
DehuaTB New Decoration Material Co., Ltd.	21.46	5.09		
Guangxi Fenglin Wood Industry Group Co., Ltd	5.985	0.50	0.66	1.49
Sichuan Shengda Industry Forestry Co., Ltd.	0.92	0.12		
Guangdong Yihua Timber Industry Co., Ltd	124.0	2.80	2.93	3.09
Jilin Forest Industry Co.,Ltd	1.66	0.35	0.14	0.02
Zhongfu Straits (Pingtan) Development Co.,Ltd	0.85	0.10	0.08	0.07
Fujian Yongan Forestry (Group) Co., Ltd.	5.01	1.09		
Guangdong Weihua Corporation	21.3	1.24	1.38	1.45

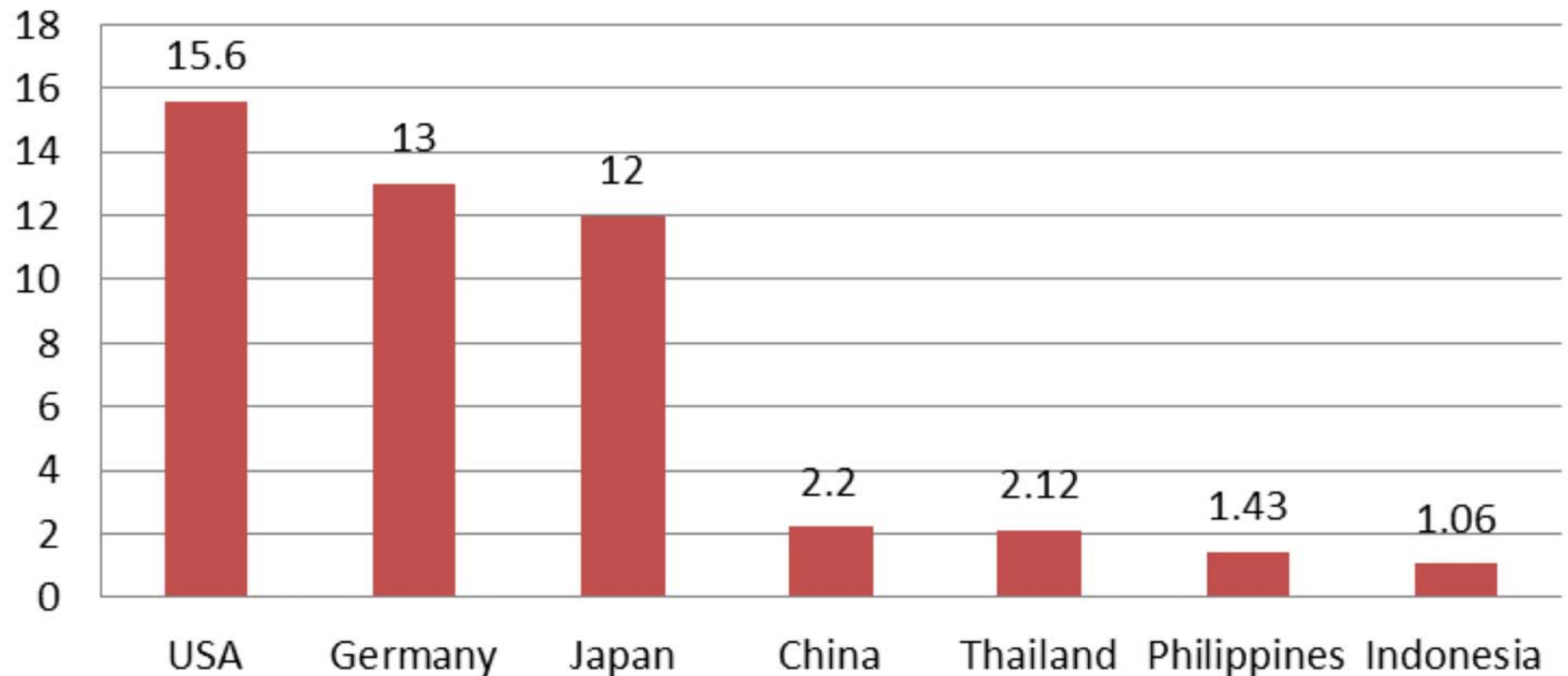
Paradigm Change in the China Wood Panel Industry

Average per capital hourly wage in manufacturing (\$)



Paradigm Change in the China Wood Panel Industry

Per capita production value in manufacturing (x\$10K)

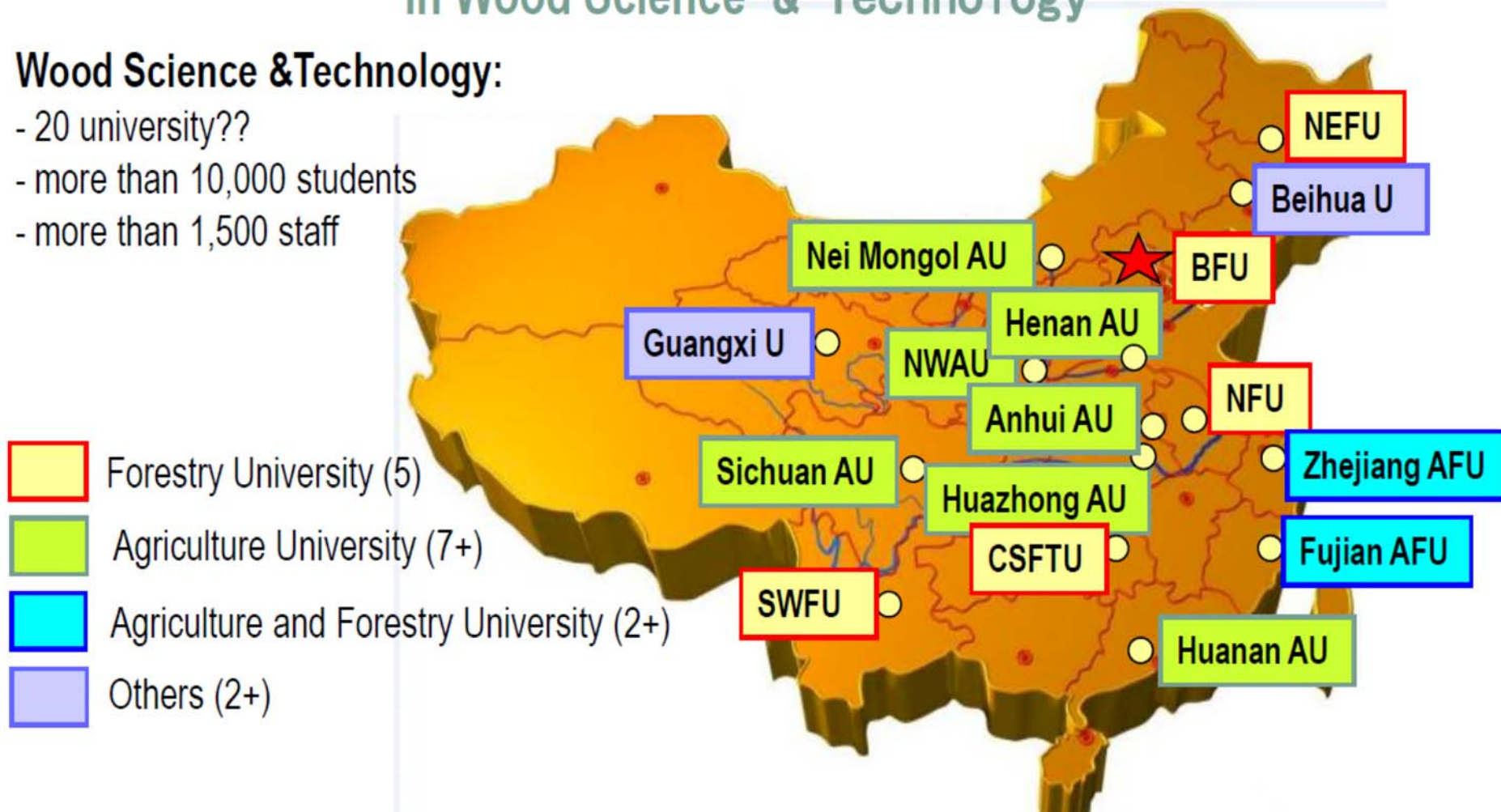


Change in the China Wood Panel Industry

Universities with Curricular in Wood Science & Technology

Wood Science & Technology:

- 20 university??
- more than 10,000 students
- more than 1,500 staff



Change in the China Wood Panel Industry

Accepting the challenges of E-commerce to transition business

	Traditional	E-business
Production model	Mass production with low cost	Low-volume production with more variety and quick response
Sales model	Factory – distributor – customer	Factory – customer
Storage model	Big inventory	Zero stock
Advertising model	Bombard aimlessly	Targeted on Brand
Management	Analogical	Digital management

Change in the China Wood Panel Industry

Preparing for coming of E-commerce Era on forest products industry

- Electronic commerce is not only the product of globalization, it is also the leading force of the globalization.
- Chinese government invested 2 billion yuan 2015 to cultivate 200 e-commerce comprehensive demonstration counties, and 10 million yuan for each one .
- The advantages of traditional wood and wood products trade are gradually replaced by the ones of e-commerce.
- The development of IT makes the asymmetric information to be symmetrical and trade profit margin to be more flat and diluted.

Change in the China Wood Panel Industry

In 2014, the transaction of mergers and acquisitions was \$396.2 billion USD in China, the highest ever recorded for a 32-year period, rising by 44% year-on-year.

Turnover in domestic M&A was \$296.1 billion, and M&A amount for foreign capital was near \$50 billion, rising by 22.6%.

Turnover of acquisition and reorganization of more than 150 listed companies was over 1 trillion yuan.

For example

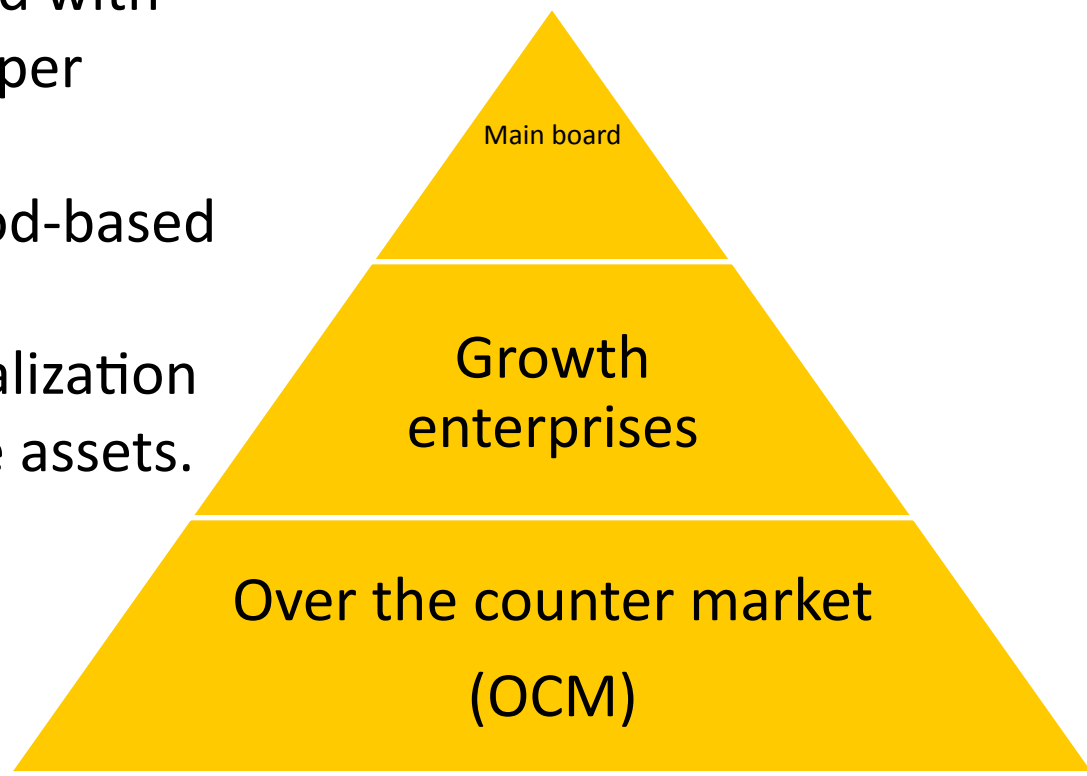
- Dare Technology Co. carries out a major restructuring by removing the diversification and expanding at low cost, to strengthen the control ability of the industry and establish the leading position of its wood-based panel.
- Jilin Forest Industry Co. holds Zhongyan Wood-based Panel Co., ranking the second in the industry.
- Guangxi Fenglin Wood Industry Group Co. acquires Altran Engineering & Research Co., participating in particle board production.

Change in the China Wood Panel Industry

In 2014, there were 2300 OCM listed companies in China, including 23 forestry enterprises, 2 affiliated with forestry, 7 affiliated with wood composite and floor, 4 affiliated with furniture and 10 engaged in paper making.

There were 26 main board wood-based listed companies.

China is in the process of capitalization and securitization of enterprise assets.



Change in the China Wood Panel Industry

Future Plan

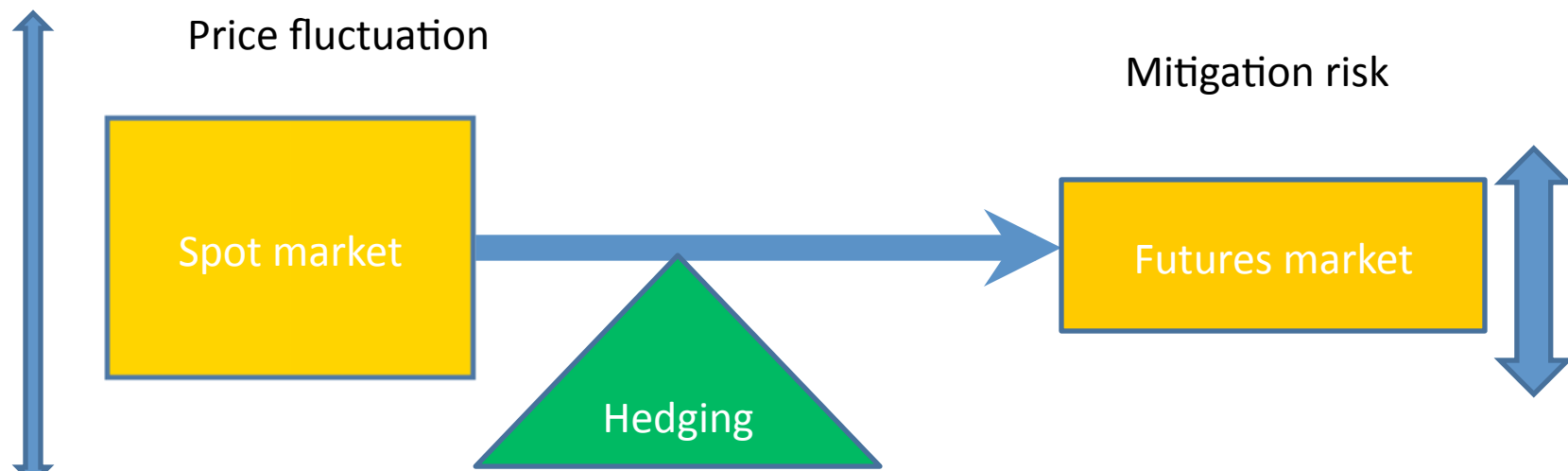
Complete futures trading of forest products and spot e-commerce market

Improve the financial attributes of forest products

Help enterprises to minimize potential losses

Convert forest products to futures

The vision is that every manufacturer is a store on the internet bus, people can shop from anywhere, for you to sell, you have to be there.



Change in the China Wood Panel Industry

Objectives of Chinese government

- On August 31, 2015, the Chinese Ministry of Industry and Information Technology and Housing and Urban Construction published a notice to promote green building materials production and application of action programs. The target is that by 2018 green building material sales should increase to 20% of all building material sold. Compared with 2015, energy consumption per unit of building material produced should decrease by 8%. The proportion of green building material use in new construction will reach 30%, green buildings 50%, pilot demonstration projects 70%, and remodeled buildings 80%. In 2030, Chinese CO2 emission of unit GDP will decrease 60-65% as compared to the emission level of 2005.

Change in the China Wood Panel Industry

Objectives of Chinese Forest Product Industry

- Annual production reaches 300 million m³, with value of more than 1 trillion yuan
- Improve product quality, promote famous brand products. The pass rate of products on spot checks reaches 95% or more
- Improve process and upgrade technology and equipment, eliminate 90% old production capacity
- Make effective use of forest resources by using 95% of plantation wood, forest residues, crop straw and bamboo
- Enhance enterprises' social responsibility and consciousness, support the social public welfare undertakings, take both economic benefits and social public welfare into account and create 100 leading enterprises.

Change in the China Wood Panel Industry

How do US wood panel industry and researchers accept the challenge and take the opportunity?

- Wood deficit in China is an obvious reality. US companies should take this opportunity to share more Chinese wood and wood composite market.
- Southern pine should be promoted.
- University and industry should work together to develop workforce and capacity to be ready to share the Chinese wood panel market-by summer camp to attract higher school student, internship to attract community college and undergraduate student, assistantship to attract graduate students.
- Industry and University should work together to develop new products and new processes-to lead the wood panel industry and research

Change in the China Wood Panel Industry

How do US wood panel industry and researchers accept the challenge and take the opportunity?

- Chinese manufacturers are more focusing on domestic market.
- We should use OSB as the leading force to share Chinese wood panel market.
- We should use housing construction as the platform to promote USA wood products.
- Industry should increase invest in research and products development.
- We should develop OSB standards similar to EU and Chinese one and develop OSB products for interior application.
- We should work on high quality, high value added and green products.

Change in the China Wood Panel Industry

How do US wood panel industry and researchers accept the challenge and take the opportunity?

- We should work on US style furniture made of OSB and plywood.
- We should work on composite container floor.
- We should develop products especially for baby.
- We should go to Hunan and Guizhou to promote US wood products.

Change in the China Wood Panel Industry

Thanks