The supply chain of bamboo industry and fully utilization of bamboo materials – A Revolution brought by primary processing factories

竹产业产业链及全竹利用 – 初加工厂为竹子工业带来革命性的变革

- Zhu Zhaohua 竺肇华, INBAR
- Jin Wei 金薇, INBAR
Challenges of the bamboo industry in China
1. Challenges of the Bamboo Industry in China (1)
中国竹产业所面临的挑战 之一

- The improvement in industrial processing technologies increases the utilization rate of raw materials
- 竹材原料利用有待提高

Great challenges is posed on the efficient utilization of raw materials, if only one product is produced, for example, bamboo flooring, the utilization rate of the culm is less than 25. The utilization rate of bamboo toothpicks is only 10%.

如果只生产单产品，原料利用率将很低，例如只生产竹地板，利用率少于25%。牙签的利用率不足10%。
1. Challenges of the Bamboo Industry in China (2)
中国竹产业所面临的挑战 之二

- The price of raw bamboo materials increases
  毛竹原料价格上涨

<table>
<thead>
<tr>
<th>Year</th>
<th>Price of moso bamboo/ton</th>
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<tbody>
<tr>
<td>1985</td>
<td>160 RMB, 54.4 USD</td>
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<tr>
<td>1992</td>
<td>240 RMB, 46.15 USD</td>
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<tr>
<td>1995</td>
<td>400 RMB, 47.90 USD</td>
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<tr>
<td>2002</td>
<td>460 RMB, 56.09 USD</td>
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<tr>
<td>2005</td>
<td>700 RMB, 85.47 USD</td>
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<tr>
<td>2007</td>
<td>810 RMB, 112.5 USD</td>
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<tr>
<td>2010</td>
<td>860 RMB, 134.37 USD</td>
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<tr>
<td>2012</td>
<td>850 RMB, 135.00 USD</td>
</tr>
</tbody>
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Take Anji County for example:
以安吉县为例：
1. Challenges of the Bamboo Industry in China (3)
中国竹产业所面临的挑战 之三

- Raw materials of bamboo becomes short in supply
  原料供应紧张

Take Anji county for example:
以安吉县为例:

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<tbody>
<tr>
<td>Local Moso</td>
<td>20</td>
<td>22</td>
<td>22</td>
<td>23</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>production (million culms)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Moso consumption</td>
<td>49</td>
<td>80</td>
<td>109</td>
<td>120</td>
<td>135</td>
<td>140</td>
</tr>
<tr>
<td>(million culms)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production value</td>
<td>4.51</td>
<td>5.31</td>
<td>6.90</td>
<td>10.58</td>
<td>11.75</td>
<td>12.87</td>
</tr>
<tr>
<td>(Billion RMB)</td>
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</tbody>
</table>
Wasted materials piled up at the gate of the factory
Bamboo waste materials pile at the riverside – Vietnam
Wasted bamboo material were burnt - Ecuador
Since the 1990s, independent primary processing factories were established which brought huge changes to bamboo processing industry. The utilization of rate of raw materials was greatly improved and brought revolutionary changes to the whole industry, the supply chain was grammatically extended.
PART II

Supply Chain of Bamboo Industry
2. 1 The utilization of different parts of bamboo (不同部分竹原料的利用)

- **Rhizome & roots** (竹鞭)
  - Handicrafts (竹壳)
  - Brushes (竹刷)

- **Sheaths** (竹壳)
  - Handicrafts (竹壳)
  - Vegetable (笋)

- **Shoots** (笋)
  - Bamboo shoots

- **Top part** (梢部)
  - Bamboo poles (竹竿)
  - Agricultural tools (农用工具)
  - Sticks (toothpicks, skewers)

- **Middle upper part** (中上部)
  - Curtain, mat, carpet (窗帘, 地垫, 地毯)
  - Woven articles (编织品)
  - Handicrafts (手工艺品)

- **Middle lower part** (中下部)
  - Laminated furniture (层积家具)
  - Flooring (地板)

- **Base part** (基部 (竹茎头))
  - Charcoal (竹基部)

- **Twigs** (竹枝)
  - Brooms (竹扫)

- **Leaves** (叶子)
  - Manure (肥料)
  - Medicine (医药)
  - Fodder (饲料)
  - Juice (果汁)
  - Pigments (染料)
  - Beverages (饮料)

- **Odds/leftover from processing** (加工的副产品)
  - Particle boards (木板)
  - Charcoal (木炭)
  - Pulp (纸浆)
  - granules (粒)
  - Fuels (燃料)
原竹进入加工厂后，把竹杆按不同部位，分成不同部分进行初加工。粗加工厂虽然不生产成品，但它成为各企业相互依赖和提高效益的纽带。
The bamboo culm was cut into several sections, each section is used for specific products. The primary processing factory has become a key chain on the whole supply-chain of the industry, where different factories rely on each other to reduce costs, and raise profits.
2.3 The utilization of the base part (浦头)

The best material for charcoal and carving

bamboo
2.4 Middle Lower Part （中下部）

The best material for flooring and furniture panels

- Raw cutting
- Splitting
- Floor strips
- Final floor product

bamboo
2.4 Middle lower part  （中下部）

- Hot press  热压
- Bending  弯曲
- Furniture  家具

bamboo
2.5 Middle Upper part (中上部)
The best material for curtain/mats/carpets, and woven products
bamboo

Yellow part

Curtain/mat

Carpet
Cement molding board
2.5 Middle upper part （中上部）

Manual slicing

Final products

weaving

Handicrafts

bamboo
2.5 Middle upper part  (中上部)
2.6 Top part (梢部)
The best material for scaffolding, sticks and fences
Hand slitting

Footplate for scaffoldings
2.7 Other parts beside the bamboo culm – full utilization of the bamboo biomass

Bamboo tips/twigs
竹枝
The best material for brooms
Bamboo leaves (竹叶)

Bamboo leaves are good materials for covering shoots and for medicine (flavonoid) and other health products.
Extracts of bamboo leaves – Flavone products

Bio-chemical

Beverages

Medicines
Bamboo roots and rhizomes utilization
Good materials for handicrafts

竹根和鞭利用

Handicrafts

brushes
Root part 竹根 – bamboo carving handicrafts （竹雕工艺品）
2.8 Utilization of the whole culm
Bamboo Poles processing (竹竿)

- Preservation
- Drying
- Straightening
- Packing
Pressed Bamboo materials
Bamboo Fiber
2.9 Utilization of residues

Bamboo sawdust

Wasted materials
Bamboo sawdust （竹屑）

Good material for particle board, charcoal and biomass-energy pellets
Bamboo powder (竹粉)
Bamboo sawdust  （竹屑）
Bamboo chips (废竹丝)

Transportation

Softening and break up

Bamboo pulp making

Paper making

bamboo
Bamboo particles  

Good material for fuel

Wasted particles for fuel
Wasted parts of bamboo culm
加工剩的废料

Good material for handicrafts/toys/disposable food containers, etc..
Bamboo shoot can be boiled and canned, or preserved for fast-food, or fermented, or baked.
Boiled and canned
Fast food, leisure food
Bamboo shoot market
2.11 Bamboo sheath utilization 竹壳利用

Good material for fodder, packaging and crafts
3. A Case Study of a Primary Processing Factory (Anji, 2005)

- **Total raw material per day:** 25 tons
- **Processed into:**
  - Utilization rate
  - 16%
  - sawdust 40%
  - base 16%
  - top 8%
  - chips 14%
  - sulcus 2%
  - others 8%
  - semi-products 12%

- 14%
- 8%
- 2%
- 12%
- 8%
- 16%
- 40%
3.1 Utilization rate and price of different parts (Anji, 2005)
加工不同部分的比率和价格（2005年）

1. Semi products: curtain strips, mat strips, carpet strips, flooring strips, toothpick strips: totally 4 tons. In the case of curtain strips: 83334 strips/ton * 0.06RMB = 4999/ton （半成品—16%）
2. Sawdust: 10 tons, 60 (240*) RMB/ton（竹粉—40%）
3. Base: 1.8-2.0 tons, 100 (200*) RMB/ton（浦头—8%）
4. Top: 3-4 tons, 300(400*) RMB/ton（竹梢—12-16%）
5. Wasted chips: 0.5 ton, 200 RMB/ton（废丝—2%）
6. Sulcus (or water way – the part under a branch which is groove): 3 tons, 350 (400*) RMB/ton（流水—12%）
7. Others: evaporation and dust, 2 tons（蒸发和灰尘—8%）

*figure updated in year 2008
3.2 Income of the factory
初加工厂的收入分析（2005年）

- **Income:**
  - Semi products: 4999 RMB/ton * 4 tons = 19996 RMB
  - Saw dust: 60 RMB/ton *(10tons–2.5tons)=450RMB
  - Base: 1.9 tons * 100RMB/ton=190RMB
  - Chips: 0.5 tons * 200RMB/ton=100RMB
  - Sulcus: 350RMB/ton * 3 tons=1050RMB

  **Total:** 21785 RMB
3.3  Costs, profits and added-value
成本、利润和增值分析

- Raw material: 700 RMB/ton * 25tons=17500 RMB  （原料 25吨）
- Labor: 1400 （工资）
- Insurance: 30 RMB/person/month, 200 RMB/day （保险）
- Fuel: 2.5 tons per day  （燃料）
- Depreciation: 66 RMB/day （机器损耗）
- Tax: 425 RMB/day （税收）
- Profit: 2195 RMB per day （每天纯利润）
- The value increase for each tons of raw material is 171.4 RMB, the increase rate is 24.5%.
- 经过初加工，每吨原料增值171.4元，增值24.5%。

Note: Bamboo farmer’s income from branches, leaves, top part and sheaths is about 2,500 RMB/he every two years; the income from shoots (winter, spring and rhizome) is about 19,300 RMB per two years (figure in year 2003).

注: 毛竹林每二年每公顷从枝条、叶、竹梢和竹枝的收入约2500元，竹笋收入包括冬笋、春笋和鞭笋等收入约19300元。
4. Main obstacles in the further development of the bamboo sector
当前阻碍竹产业链继续延伸的主要障碍

4.1 The chaotic competition among enterprises brings harms to all businesses, especially harms to large and excellent enterprises, the price competition results in zero or minus profit. The following case of bamboo flooring production shows the seriousness of the problem:

- 4.1 公司间的无序竞争造成企业,特别是生产优质产品的大型企业受到伤害,企业间互相压价造成利润率下降,逐渐降至零和负利润.下面我们以竹地板生产为例可以看出问题的严重性:
Because of the shortage in raw materials and labor, product costs had been increasing, the profitability of bamboo products reduced.

The average costs and price of bamboo floor board for each year (horizontal and vertical pressed)

<table>
<thead>
<tr>
<th>Year</th>
<th>Cost of Raw Materials/m² (RMB)</th>
<th>Cost of product/m² (RMB)</th>
<th>FOB (RMB)</th>
<th>Exchange rate with USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992-1993</td>
<td>52.1</td>
<td>86.04</td>
<td>250</td>
<td>1:5.5</td>
</tr>
<tr>
<td>1995-1998</td>
<td>56.1</td>
<td>92.7</td>
<td>220</td>
<td>1:8.7</td>
</tr>
<tr>
<td>2001-2003</td>
<td>59.6</td>
<td>98.43</td>
<td>145</td>
<td>1:8.2</td>
</tr>
<tr>
<td>2006-2007</td>
<td>62.5</td>
<td>103.2</td>
<td>110</td>
<td>1:7.5</td>
</tr>
<tr>
<td>Present</td>
<td></td>
<td></td>
<td></td>
<td>1:6.8</td>
</tr>
</tbody>
</table>
4.3 Lack of new products of high added-value

- The development of high-added-value products are comparatively laid back, once a new product is released, the other enterprises may soon follow up, which results in dramatic drop of market price, the competitiveness of the product soon disappears.

- 高附加值的新产品相对滞后，一旦新产品问世，更多其他企业迅速跟进，使该产品市场价格下降，产品竞争力很快消失。

- Presently, products such as bamboo reconstituted boards, fiber boards and bamboo curtain and mats which used to be prospective new products for the markets are facing the above threads. At the same time, as the profit rate of bamboo products are decreasing, the capacity of new product development is also reducing.

- 目前竹重组板、纤维板和竹地毯等，这些曾被市场看好的新产品正在面临上述风险。同时，由于产品利润率下降，新产品开发的能力相应下降。
Thank You!