



Analysis of the prospects and competitiveness of the bamboo product design industry based on planed and micro-thin bamboo technology

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ABSTRACT: During the long historical evolution and aesthetic practice of Chinese culture, bamboo has not only been used in people's daily lives, but has also become an aesthetic object of the spirit of traditional Chinese culture with its natural nature, unique character and refreshing charm. Bamboo is a pioneer in environmental protection and can replace wood and even plastic in many aspects due to its hard texture. Therefore, the development and utilization of bamboo resources, give full play to the role of "bamboo instead of wood", is not only an effective way to alleviate the tension between the supply and demand of wood, but also the development of circular economy, the inevitable requirements of building a resource-saving society. The development of the bamboo industry is an important support for building a forested Zhejiang province and achieving the goal of a strong green economy. This paper introduces bamboo products based on planed micro-thin bamboo technology, and analyses in detail the industrial prospects and competitiveness of the relevant bamboo products, so as to arrive at an outlook and vision for the development of the bamboo products industry.

KEYWORDS: Sliced micro-thin bamboo technology; bamboo product design; market competitiveness; marketing methods

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I. INTRODUCTION

The principle of the plane-cut micro-thin bamboo technology is to hot-press the bamboo pieces into radially integrated bamboo blocks, then cold-press the bamboo blocks into bamboo squares, then soften them by steaming, plane-cutting, polishing and shaping, and through advanced hot-pressing, anti-corrosion, printing and other technical processing, so that the thin bamboo derivatives overcome the problems of low toughness, unclear patterns and collection difficulties, broaden the types of bamboo derivatives, but also highlight its ancient charm and simplicity, colour and It also highlights the simplicity, texture and elegance of the bamboo derivatives. The thickness of the bamboo is generally between 0.15 and 0.50 mm, but can also be bonded in multiple layers up to 3.00 mm, with a certain degree of light transmission and textural characteristics, allowing for the dyeing of products of different styles, in line with people's psychological needs and to meet different occasions, while also following the requirements of environmental sustainability [1].



Fig.1 List of applications based on planed micro-thin bamboo technology

The main scope of application of the planed micro-thin bamboo technology is mainly in the technology-based, cultural and creative, office, decorative, engineering type of these products [2]. It is unique to apply it to lamps and lanterns, which are shapers of light, light is a form, light is a mood, and can lead a new lifestyle of health and fashion. The two complement each other: without light, the light will be useless and empty shell; without light, the light cannot appear within our control. It can also be used to make thin bamboo business cards. Exquisite life with bamboo instead of wood, thin bamboo business cards mainly focus on middle and high-end business groups. Low-carbon life with bamboo instead of wood, the business card will spread the concept of low-carbon and environment-friendly life widely. Apply it in furniture business, integrate bamboo elements and bamboo material into furniture design, making the office environment and living environment more rich in natural intimacy. Thus improving the happiness of life and quality of life [3-7].

Bamboo products have the following advantages, namely, bamboo instead of wood - the implementation of China's natural forest protection project makes precious thin wood species sources are increasingly rare, and the use of artificial board is low value, limited use, can not fully play a role in place of wood [8]. And the planed micro-thin bamboo can partially replace the cherished species of thin wood, so its prospects are very broad; low-carbon life - the production of raw materials from natural bamboo, bamboo relative to wood has the characteristics of fast growth, early lumber, the use of bamboo products can effectively alleviate the loss of wood resources, and the protection of the environment is of great significance. The products made of bamboo have clear texture and harmonious tone compared with wooden products, and the products have good decorative effect, which can be carbonized or directly used in the original color, which can better meet the needs of products; exquisite life - make full use of the technology of planing and cutting micro-thin bamboo, and apply it to the lighting [9, 10]. This technology can be applied to the development and production of lighting products, which can design lighting products that appear more high-grade atmosphere, warm and harmonious, fresh and natural.

II. BAMBOO PRODUCT BACKGROUND

2.1 USE THE ADVANTAGES OF "BAMBOO" OVER "WOOD"

Nowadays, more than 90% of the materials on the market are plastic, wood and other materials. With the development of national economy, the contradiction between supply and demand of wood is becoming more and more prominent, in this form, it is urgent to find a resource that can replace wood, so people turn their attention to the bamboo resources in China . Because bamboo grows fast and becomes timber early, it is in line with the low-carbon environmental protection concept advocated nowadays,

which is of great importance to alleviate the contradiction between supply and demand of wood in China and optimize and protect the ecological environment [11]. At the same time, bamboo also has a natural, environmental health, fresh and beautiful and elegant these three characteristics. The natural color and special texture of bamboo, just like the poet Su Dongpo in Song Dynasty, "I would rather eat without meat than live without bamboo". At the same time, bamboo can regulate indoor humidity, absorb ultraviolet rays, anti-static, beneficial to human health. Especially after deep carbonization, the processed products will not change color, which can strengthen the role of adsorption of harmful indoor gases [12]. In addition, the natural color of bamboo, flexible, moisture-proof, high hardness, bamboo will also emit fresh fragrance gas, conducive to physical and mental health [13].

2.2 POLICY SUPPORT

Since ancient times, the Chinese people have the tradition and habit of loving, appreciating, eating and using bamboo, and bamboo has made indelible merits in the history of the Chinese people. In China, bamboo has been widely used in construction and building materials, paper, textiles, biomedicine, food and chemicals, health care, beauty and make-up, culture and art, as well as to improve the ecological environment and many other fields, has become the basic material in the spiritual and cultural needs, production and living needs [14].

Bamboo resources are sustainable resources, bamboo industry is the most market potential and the most dynamic sunrise industry, belongs to the green, low-carbon, environmental protection and ecological civilization construction and sustainable development of the industry. Bamboo industry has become one of the most potential and dynamic sunrise industries in China and the world, has been recognized by the world, and become the world-wide government to promote the development of new industries [15, 16].

2.3 INDUSTRIALIZATION PROSPECTS

As we all know, China's forest resources are scarce, and the forest stock only accounts for 3.2% of the world, but the annual consumption of wood is alarmingly high [11, 17, 18]. According to relevant data, China's current timber consumption averages more than 300-360 million m³ per year, and may reach 390 million m³ by 2008 and 460 million m³ by 2015. According to the demand forecast data, the minimum gap between wood supply and demand in the future (2008-2020) will be 0.6-1.3 billion m³ per year [19]. One of the main reasons for such a huge gap between supply and demand is that most domestic and foreign decorations use solid wood flooring as well as solid wood laminate flooring and furniture panels. It is these demands that lead to the scarcity of wood, especially the precious hard broadleaf wood resources [20, 21]. Zhanping bamboo can make bamboo flooring, bamboo furniture, bamboo structural material, etc., which can replace wood flooring and its products, and bamboo has the characteristics of strong regeneration ability and short growth cycle, so it can effectively alleviate the scarcity of wood, especially precious hard broad-leaved wood resources [22, 23].

At present, in the field of bamboo flattening technology, only Nanjing Forestry University and Zhejiang Forestry College have carried out preliminary research on this technology [24]. The superior performance of the spreading bamboo panel itself: the project team owns the invention patent of this technology; the raw materials are easily available, and the various raw materials used in the project are all pure natural and harmless materials, which are in line with the current development trend of environmental protection. In addition, the partner company has advanced production technology, and the team that won the second prize of the National Technology Invention Award is guiding the development of new products, which provides strong technical support for the development of the enterprise, and gives the enterprise a greater advantage in the development of subsequent products, the improvement of the process and the reduction of production costs. The current development of science and technology, the requirements of environmental protection are getting higher and higher. And this product from raw materials to finished products are natural and pollution-free products, in line with the requirements of environmental protection. 397 million square meters of indoor flooring production in China in 2022, including 25.1 million square meters of bamboo flooring; bamboo daily necessities in bamboo cutting board production of about 30 million square meters; 3 million cubic meters of wood for outdoor landscape in 2022; bamboo spreading flat panels can replace part of the existing bamboo flooring, bamboo cutting boards, tea plates, Fruit plate and other consumer goods and outdoor flooring, building facades and other outdoor landscape with wood, will be increasingly used in construction, decoration, furniture manufacturing, bamboo daily necessities and other fields, there will be rapid growth momentum, the development potential is huge. It can be foreseen that bamboo products made of bamboo non-cracked flat panels will be popular in the international market in the future [25, 26].

2.4 ECONOMIC BENEFIT ANALYSIS

According to the sales revenue ledger and VAT invoices, sales contracts and other information provided by a company, the audit confirmed the implementation of the project, which has achieved sales revenue of RMB15,156,200, new net profit of RMB3,682,700 and new tax of RMB1,768,000 in 2013.

The product sales price is 380 yuan/m², the cost is 112 yuan/m²; of which the profit is 268 yuan/m², tax is 12.6 yuan/m²; profit tax is 29 yuan/m². Among them, has established an annual production line, is expected to achieve annual sales of 18 million yuan new net profit of 3.6 million yuan, new tax 2 million RMB.

Experiments have been carried out with the pilot production line designed by the round bamboo unfolded board project team, and its production costs are estimated as follows.

Table 1 Technical costing for the production of round bamboo unfolded panels

Name	Cost of fees (RMB/m ²)	Remarks
Raw materials	70	
Accessories		
Wages	30	
Manufacturing	12	Depreciation of equipment, electricity, manufacturing costs
Total production costs	112	
Period costs	15	Finance costs, selling expenses
Sales price	380	

In 2011, China produced 25.1 million square metres of bamboo flooring, with an output value of up to RMB 3 billion; bamboo chopping boards produced about 30 million square metres of bamboo daily necessities, with an output value of up to RMB 3.6 billion; 3 million cubic metres of wood for outdoor landscaping, with an output value of up to RMB 24 billion. If the current production and market demand, bamboo panels can replace some of the existing bamboo flooring, bamboo chopping boards, tea plates, fruit plates and other consumer goods, as well as outdoor flooring, building facades and other outdoor landscape materials. It can directly increase the employment of more than 500 people, and according to the calculation of the annual output of 300,000 square meters of bamboo unfolding materials after the project reaches production, it needs to consume 900,000 pieces of moso bamboo, increasing the income of farmers by 18 million yuan and associating 9,000 farmers.

III. PRODUCTS & TECHNOLOGY 3.1 FOR STUDENTS

3.1 PRODUCTS

The main products are "Bamboo Light" lamps, "Chengzhu" air humidifiers and "Bamboo Visit" thin bamboo business cards, as most people in the market prefer the new Chinese design, the main components of the lamps are made of The main components of the luminaire are made from thinly sliced and processed bamboo, bonded with non-woven fabric, and made into large format sliced and thin bamboo with high strength, then polished, printed, cut and chamfered into bamboo materials with certain light transmission, flexibility and texture characteristics, which are designed and assembled with other materials [27, 28]. We also develop and design other lighting products in the same style.

The "Chengzhu" air humidifier adopts a modern and simple design style, the product is in line with the industrial style, loved by young office workers, in addition to the realization of the product's functional combination, the humidifier and small speakers and aromatherapy lamp function reorganization. Not only does it diversify the functions of the humidifier, but it also reduces the office area to a certain extent, relieving office pressure and improving office motivation and efficiency [29-31].

The raw material of "Bamboo He" is natural bamboo, which is fast-growing and early-forming, in line with the low-carbon concept of environmental protection advocated today, and is in line with the development of the times. The non-woven fabric is added to the raw material to improve the performance of the product [32, 33].

3.2 PRODUCT FEATURES

The natural bamboo is used as the production material, its texture is pure, soft and friendly, clear texture, high-end atmosphere and good decorative effect. Used on postcards and high-end business cards, it reflects a certain collector's value [34]. With its unique fragrance, the bamboo material can be used for products that not only fulfil the basic functions of the material, but also the additional functions of the material, making the product high end and high class [35].

Compared to wood, bamboo has a much shorter growth cycle. It takes 20 or even 50 years for a sapling to grow into a large tree, while bamboo grows from ground breaking to over ten metres high in just

60 days. In ecological terms, bamboo is a renewable material with a small growing area, low land requirements and a beautiful shape and strong environmental regulation [36].

After up to ten years of scientific and technological research and development, a mature product line has been formed, which can make it possible to mass-produce the products and to reduce the outgoing price of the products to a certain extent, even some of them are slightly lower than the relevant substitutes in the market, giving benefits to consumers [37, 38].

IV. MARKET ANALYSIS

4.1 MARKET VOLUME

4.1.1 TOTAL MARKET VOLUME OF LAMPS AND LANTERNS

The number of families in China is 430 million, the highest in the world, and the size of families is getting smaller, with an average family size of 3.02 people. With such huge figures, even if only 1/20th of the families need to decorate and replace their lamps every year, there are still nearly 21.5 million households, so it is clear that the market for lamps occupies a certain proportion. The market for entertainment and decorative lighting is therefore also on the rise [39, 40].

4.1.2 ANALYSIS OF THE MARKET FOR THIN BAMBOO BUSINESS CARDS, POSTCARDS AND BOOKMARKS

For many years, postcard products are mostly customized by enterprises and institutions, but in recent years, affected by the policy, corporate customized products have been significantly reduced, but the retail part of the sales are still more limited, with a very low percentage of sales [41, 42]. This phenomenon, on the one hand, and modern people are keen to fast food consumption, indifferent to traditional culture, but on the other hand, also with the postal products can not keep up with the times, the lack of personality is not unrelated. Postcards create a new "business card" for the city [42, 43]. At present, the postcard market is relatively small, and the overall income of the enterprise is not obvious, the market cultivation costs and the customer's criticality of the product are high, so the development of the individual postcard market is a "benefit in the present, merit in the long term" strategic work [44, 45].

4.1.3 AIR HUMIDIFIER

With the continuous deterioration of the ecological environment, the high popularity of air conditioning systems, the prevalence of serious respiratory diseases and the continuous improvement of the material living standards of the nation, the health awareness of consumers has increased tremendously and the indoor air environment has become an increasingly important issue for people. Purifying the air environment has become an increasingly urgent desire and requirement for people, which provides a rare opportunity and development space for the air humidifier industry. The product has a small investment, large profits and a large market potential. In the coming decades, as people in China become more aware of environmental protection, air humidifiers will have a vast market [46].

4.1.4 ACCESSORIES MARKET ANALYSIS

Modern people pursue leisure, quiet life, the pursuit of a spiritual satisfaction, and thin bamboo ornaments give people an elegant, calm, noble feeling, very suitable for the modern life that most people pursue, can meet their spiritual world, so the demand for bamboo series of crafts, ornaments is also increasing.

4.2 PRODUCT POSITIONING

4.2.1 MARKET AND POSITIONING OF THE "BAMBOO LIGHT" LUMINAIRE

The bamboo lamps and lanterns are mainly for home decoration and shopping mall decoration. After incorporation, the company will take the coast as its access market, and according to the company's strategy, Beijing, Guangzhou, Anhui, Tianjin, Hunan, Guizhou, and Hubei will be listed as the market areas under development after the establishment of the company. Specifically, our customer direction is divided into entertainment industry groups such as major entertainment venues, KTV, shopping malls, hotels, etc.; medium and high-end people such as house decoration needs; general situation needs such as bad need to replace.

4.2.2 "BAMBOO HE" THIN BAMBOO BUSINESS CARD, "BAMBOO TOUR" POSTCARD, "BAMBOO VIEW" BOOKMARK AND POSITIONING

Postcards can be printed in bulk, are in high demand and spread quickly. In particular, postcards can be designed to commemorate the theme of the campus, and then from the various tourist attractions in Nanjing to design a series of hand-painted postcards with strong regional characteristics to open up the sales market, and can be expanded to the country's tourist cities with a large flow of people, such as Xi'an, Kunming, Hangzhou, etc.

4.2.3 MARKET AND POSITIONING OF THE "BAMBOO MIST" AIR HUMIDIFIER

This category is dominated by the middle and high-end young and middle-aged office group. As the ecological environment continues to deteriorate, consumers' health awareness has greatly increased, and the indoor air environment is becoming increasingly important to people. Purifying the air environment and improving air quality has become an increasingly urgent desire and requirement for the air humidifier industry, which provides a rare opportunity and room for development. The product investment is small, the profit is large, the market potential is large. In the coming decades, as people in China become more aware of environmental protection, air humidifiers will reach a wider audience.

4.2.4 MARKET AND POSITIONING OF "BAMBOO ART" ACCESSORIES

Thin Bamboo jewellery is positioned for young women's groups. Modern people advocate a healthy, simple, stylish and quiet life, and this range of jewellery caters to the needs of young women. At the same time, these accessories have great attainments in terms of cost and product innovation, and are very popular among young women.

V. COMPETITIVE ANALYSIS

The bamboo derivatives produced by the planed micro-thin bamboo technology belong to the middle and high-end market products for the low-end market competitors, as well as other textured alternatives of the same kind, due to the material production and processing technology threshold restrictions, there are a total of six main competitors. The first is the raw material supplier, whose advantage lies mainly in the fact that the bamboo processing technology is the result of research by Professor Li Yanjun and his colleagues, and the processing technology is at the international leading level. The disadvantage is that once the market is opened, the profit margin will attract many other manufacturers to enter, threatening to fall into vicious competition; the third is other medium and high-end manufacturers, the unique texture of the shaved micro-thin bamboo products, with cultural connotations, strong symbolism, other materials of medium and high-end materials are also our potential competitors, such as metal, plastic, wood, etc.; the fourth is related substitutes, whose advantage is mainly In the bamboo derivatives with strong consumer acceptance, good decorative effect, with environmental sustainability characteristics, the life of people's physical and mental health benefits, etc., is one of the first; fifth is the same industry competition, its advantage is mainly in comparison with the universal products, bamboo class of visual sense of good, with a better decorative effect. With other materials difficult to imitate, difficult to copy the product characteristics and decorative effect, its disadvantage is that compared to other products, the manufacturing cost is high.

Compared to other similar products in the industry, the advantages of the products produced by the planing and micro-thinning technology are mainly as follows: from the use of functional sense of vision, bamboo appearance is different, strong sense of decoration; from the product technology, processing technology at the international leading level, production technology we have an absolute advantage; from the green environmental protection, the selection of environmentally friendly, bamboo production process is environmentally friendly, the price is low alternative to rare wood, bamboo products meet the national E0 grade standard.

VI. SUMMARY

The development of the bamboo industry is an important support for building a forested Zhejiang and achieving the goal of a strong green economy. The project is based on the marketing concept of "environmental protection and nature, elegant and livable", with "low-carbon and exquisite living" integrated throughout the marketing activities. The team will improve strategic governance rules, enhance corporate resilience, bring in talented senior personnel, strengthen the project's R&D investment and keep abreast of marketing changes to ensure the project runs smoothly. "Green water and green mountains are the silver mountain of gold." The team will adhere to this philosophy and contribute to the development of the bamboo industry and the construction of ecological civilization.

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