

International Bamboo and Rattan Organisation



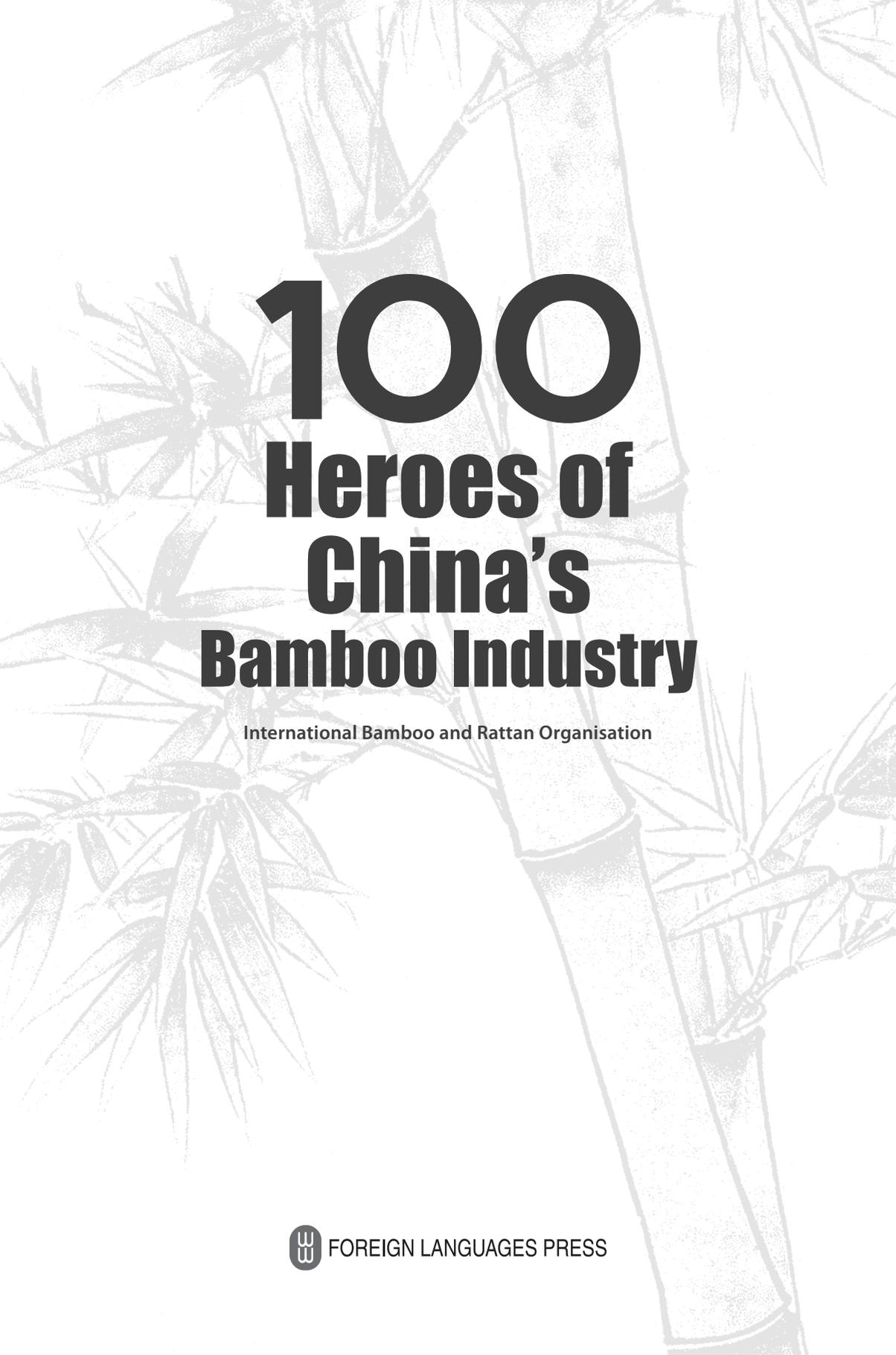
100 Heroes of China's

Bamboo Industry



FOREIGN LANGUAGES PRESS





100 Heroes of China's Bamboo Industry

International Bamboo and Rattan Organisation



FOREIGN LANGUAGES PRESS

First Edition 2017

ISBN 978-7-119-11069-1

©Foreign Languages Press Co. Ltd, Beijing, China, 2017

Published by

Foreign Languages Press Co. Ltd

24 Baiwanzhuang Road, Beijing 100037, China

<http://www.flp.com.cn> E-mail:flp@cipg.org.cn

Distributed by

China International Book Trading Corporation

35 Chegongzhuang Xilu, Beijing 100044, China

P.O. Box 399, Beijing, China

Printed in the People's Republic of China



In celebration of the 20th anniversary of
the International Bamboo and Rattan Organisation

Preface

Zhang Jianlong

Minister, State Forestry Administration, P. R. China



In the 5,000-year history of the Chinese nation, bamboo has all along played an important role in the work and life of the Chinese people. The famous poet Su Dongpo of the Song Dynasty said, “We eat bamboo shoots, live in bamboo-tiled homes, ride on bamboo rafts, cook on burning bamboo, wear clothes of bamboo bark, write on bamboo paper, and walk in bamboo shoes. We cannot live a single day without bamboo.” Even today, bamboo and its products remain intimately linked with the daily life of Chinese people.

In 2015, the 2030 Agenda for Sustainable Development was adopted at the UN Sustainable Development Summit, focusing on poverty eradication, environmental protection and green development. The Chinese government attaches great importance to green development and poverty alleviation through ecological progress. China’s President Xi Jinping stresses that clear waters and green mountains are invaluable assets. This strategic thought vividly reveals the dialectic relationship between ecology and economy, and between protection and development. It fully embodies the determination of the Chinese government in promoting ecological progress. As a good friend of the poor, bamboo is a precious renewable resource and a new material of green economy. It will surely play a unique role in achieving the goals of poverty eradication, environmental protection and green development.

The Chinese government attaches great importance to developing the bamboo industry. China has the most abundant bamboo resources and the largest bamboo forest reserve in the world, and is the earliest country to develop and utilize bamboo resources. The Chinese bamboo industry covers building materials, home furnishings, foodstuff, handicrafts and other fields, with more than 10,000 kinds of bamboo products in 100 different categories. The bamboo industry, flower industry, forest tourism and forest food industry have become four sunrise industries in China’s forestry development.

With a view to making bamboo industry play a more active role in global efforts to achieve the UN's Sustainable Development Goals, the International Bamboo and Rattan Organisation has cooperated with Chinese partners and spent over two years in compiling *A Hundred Heroes of China's Bamboo Industry*. The book tells stories of bamboo industry development in China. From the perspectives of economic development, improvement of people's living standards, environmental protection, technological innovation and the bamboo culture, the book tells unique, fresh and lively stories about the processing and utilization of bamboo resources, bamboo trade, technological innovation and personnel training, bamboo forest ownership reform and poverty alleviation, and bamboo forest tourism and promotion of bamboo culture. The people featured come from a wide diversity of backgrounds. Some are academicians and scientists focusing on bamboo materials and bamboo classification and cultivation; some are entrepreneurs engaged in bamboo flooring products and bamboo home furnishings; some are farmers prospering through bamboo; some are superbly skilled exponents of bamboo weaving and carving crafts; some are civil servants and promoters of science and technology with their careers dedicated to bamboo industry development... the list goes on.

I am acquainted with some of the people who appear in these pages and am moved by their stories. I hope that the book will touch readers too, so they may share in their love of bamboo, their determination to develop the bamboo industry, and their delight in their successful bamboo careers.

I hope that readers will like these people and their stories. I hope the book will help readers to gain a vivid understanding of China's bamboo industry and forestry. And I hope the book will promote bamboo industry exchange and cooperation between China and the rest of the world.

May all those who love bamboo around the world join hands in building a beautiful and eco-friendly home shared by all.

Preface

Dr. Andrew John Bennett
Chair, INBAR Board of Trustees



This book brings together real-life stories of the people and industries behind the bamboo sector in China; it is a record of the “bamboo people” and their journeys through a hundred Chinese bamboo stories.

Bamboo is deeply rooted in the 5,000-year history and rich culture of China. No plant has had a more profound impact on Chinese traditions, music, literature, art, culture, and economy. Bamboo influences over 100 radicals in Chinese characters.

With the extensive bamboo resources, China has become the world leader in innovation and the effective utilization of bamboo; with an industrial annual output value of US\$30 billion, it supports the livelihoods of millions of people across China.

While bamboo has always played a central role in China, it is only over the last few years that industries and entrepreneurs have begun to realize and exploit its incredible potential. China has promoted the development of its bamboo sector by bringing together deeply entrenched historical values, innovation and tenacious entrepreneurial spirit with support from the government through policies and investment.

Bamboo has been identified as an important opportunity for contributing to sustainable development as a part of the ambitious Belt and Road Initiative, proposed by President Xi earlier in 2013.

In my travels across the bamboo-rich regions of China, I have seen how policy support, investment and extraordinary ingenuity have given rise to a wide variety of products that have promoted the sustainable use of bamboo, many of which are relatively unknown to the rest of the world. It is not possible to identify every single factor that has played a critical role in developing the bamboo sector in China; however these stories illustrate some of the factors that have contributed to the successful evolution of the bamboo culture and industry in China.

There are stories of artists, delicately recreating the calligraphic styles from over

2,000 years ago; entrepreneurs who have developed fire-retardant bamboo materials for construction (some of it used in the international airport in Spain) and scientists quantifying the benefits bamboos can play in combatting climate change. While others take on the task of preserving the intangible artistic culture passed through generations and the impassioned and enduring bonds between the Chinese people and the humble bamboo, this book has stories that highlight the patience and entrepreneurial spirit fostered by leaders, working with farmers towards increased prosperity. They show how China is a global pioneer in developing bamboo industries.

While there have been many individuals who have advanced the bamboo sector, I would like to highlight the invaluable contributions made by the INBAR Co-Chair, Prof. Jiang Zehui, and Chen Yunhua.

I have had the privilege of knowing Prof. Jiang Zehui as a colleague and a friend for several years. She has spearheaded scientific and technological innovations in the bamboo and rattan sector, both in China and globally. As one of the world's leading forestry scientists, she has dedicated her entire life to the promotion of bamboo and rattan. She has pioneered many firsts in China, from authoring hundreds of bamboo books to chairing the technical committee for ISO TC/296 to establish global standards for the use of bamboo products in trade and the construction industry.

She played a seminal role in establishing INBAR and the generous support it receives from the Government of China.

Chen Yunhua or Master Chen is renowned for creating exquisite bamboo weaving art. He is the inheritor of this intangible cultural heritage of China. He has supported INBAR through a number of training programmes, and has helped numerous people across China and Africa learn the skill of bamboo weaving and thus improve their livelihoods.

They along with other individuals mentioned in this book offer a rare glimpse of the development of bamboo sector in China.

I am delighted to see the publication of this book. I am grateful for the invaluable support offered by the various organizations and entrepreneurs who have worked with INBAR to bring these stories to light. I hope it will inspire and empower readers on their own quests towards realizing the potential of bamboo to support sustainable and green development.

Words from the Editors

Since the establishment of the International Network for Bamboo and Rattan (INBAR, renamed International Bamboo and Rattan Organisation since July 2016), many government officials, experts, scholars and private sector representatives from INBAR member states have come every year to Beijing for training courses or policy seminars sponsored by the Chinese government and co-organized by INBAR and the International Center for Bamboo and Rattan (ICBR). The Beijing-based training courses and the field trip inspections in Zhejiang, Anhui, Sichuan and other bamboo areas hold their attention and prompt many questions. One FAQ is: “Many other countries have bamboo resources in abundance, so how come it’s China that puts bamboo to such good use?”

“China has a long history of operating and utilizing bamboo forest; there’s a big market for bamboo products and a great many consumers; the government has support policies ...” such generalized answers seem to leave the questioner none the wiser. “Achievement comes from effort” is an old Chinese saying, and China’s good use of bamboo, the good development of its bamboo industry and the richness of bamboo culture are all products of human efforts, the result of down-to-earth work by bamboo farmers, businessmen, science and technology experts, administrators and artists. The best answers to the question are to be found in stories about such groups of people. We, the editors believe it necessary to sketch the big picture background to their stories, to help readers to a full understanding.

Creative Science and Technology Experts

The capacity to innovate in science and technology is a decisive factor determining the development and market competitiveness of the bamboo industry. Before the initiation of reform and opening up in 1978, compared with the highly developed

forestry industries of Europe and the US, China's bamboo industry had a long way to go in respect of the level of R&D, its application capacity and its contribution to industry development.

Propelled by systemic reform in China's forestry sci-tech, the period 1978-2000 saw bamboo industry R&D take off and the development of systems to apply the fruits of research, and the level of science and technology in the bamboo industry rose very rapidly. Nevertheless, there was a mismatch between the development of sci-tech and the development of bamboo industry, to the extent that bamboo forestry experts seemed to focus on publishing academic papers rather than on applying their research fruits in the bamboo industry.

Entering the new century, pushed by the more demanding requirements of the economy and industry, China put forward the sci-tech development goal of building China into an innovative country by identifying the strengthening of independent innovation capability as key to adjusting industrial structures and changing the mode of growth. A beneficiary of this decision, R&D investment for the bamboo industry increased remarkably, the creative cohort combining three generations of scientists expanded, and there was conspicuous improvement in the capability of innovation. The number of published papers on bamboo science and technology, patent applications and standards issued reached record levels, and great quantities of bamboo processing equipment with independent intellectual property rights went into use and entered the international market. China's bamboo science and technology was now on the fast track.

Now with sci-tech prowess behind it, China's bamboo product imports and exports in 2015 amounted to US\$1.5 billion, ranking first in the world. The total value of China's bamboo industry exceeded US\$30 billion. In China's major bamboo areas revenue from bamboo contributed 20 percent of farming household income and sometimes even more.

Bamboo planting and cultivating technologies were recorded in two Chinese books as early as 1,500 years ago. One was *The Bamboo Directory* by Dai Kaizhi in the period of the Wei, Jin and Southern and Northern Dynasties. The other was a comprehensive book on agriculture, *Essential Techniques for the Welfare of the People*, which was written between 533 and 544 by Jia Sixie, an outstanding agronomist. Thousands of years later, technologies relating to bamboo planting, cultivating and utilizing are advancing at breakneck pace, but alongside opportunities there are challenges. How to further stimulate and sustain the passion of bamboo sci-tech personnel engaged in R&D, how to secure the innovative achievements and interests of these scientists, and how to encourage enterprises to embrace innovation and energetic application of new technologies, standards, and patents — these are the long-term challenges and tasks of China's bamboo industry regarding innovation in science and technology.

Private Enterprise Operators Undeterred by Market Risks

Entrepreneurs in China's bamboo industry today can be considered fortunate indeed. The vast majority of them are private owners. After 1978, with the constant reforming and improving of China's economic system and mechanisms, China has transited rapidly from a unitary planned economy to a planned commodity economy and then onto a socialist market economy. Today, 15 years after China's accession to the WTO, it is actually the Chinese government that is urging the 81 WTO members such as the US, Japan, the EU, Russia, Brazil, New Zealand and Australia to study and respect its promises on world trade, and recognize China's full market economy status as soon as possible.

Full market economy status is of key importance to China's bamboo processing enterprises, to export-oriented processing enterprises in particular. Export-oriented policy has long been China's economic development policy, and the bamboo industry has benefited greatly as a result. China's import and export trade in bamboo products accounts for more than 60 percent of the total bamboo trade in the world and has ranked in first place for a long time. The US, Europe, Japan and South Korea are China's main export markets for bamboo products. Their recognition of China's full market economy status will naturally generate policies favorable to China's bamboo processing trade enterprises.

Actually, of China's total bamboo industrial value of about \$30 billion, only 5 percent comes from bamboo product exports. The home market is obviously the major concern of entrepreneurs. For nearly 30 years running, China's economy has seen high speed growth, and the concomitant rapid expansion of real estate and home renovation provided wealth-making opportunities for bamboo operations of all sizes in bamboo furniture, flooring and formwork.

Of course, as people in the bamboo business see things, the golden days for trade, domestic and foreign alike, are a thing of the past. Their business environment faces new and huge challenges such as domestic excess capacity, higher labor costs, slacker demand for bamboo products reflecting downturns in domestic real estate and home renovation markets, and weak export growth resulting from the global slowdown of economic growth, etc. Such factors are a source of heavy pressure and great challenges for operators. But, if the government creates a more relaxed business environment at home and abroad and provides greater support for sci-tech innovation, and if enterprises move more quickly in a resource-saving and environment-friendly direction, those in the bamboo business can anticipate the return of good times.

Optimistic and Hard-working Bamboo Farmers

China is a big agricultural country, a developing country. In 2016, its population stood at 1.39 billion, of which urban population was 0.7 billion and rural population

0.69 billion. The per capita disposable income of urban residents was RMB31,195 as against the rural figure of RMB11,422. The huge income disparity shows the urgent need for rural economic development. There are still 70 million poor people in China, and the task of eliminating poverty and improving livelihood is most necessary in the rural areas.

Despite the big income gap, China's farmers are quite content with their life, and that includes bamboo growers too. The reasons are many: first, abolition of the millennia-old agricultural tax was joyously received; moreover, farmers have become effectively the owners of their land following changes introduced under reform and opening-up, such as "output-linked contract," the forest right system reform whereby forest and land is contracted to households, and the coming reform of the rural land use system. In addition, improvement and implementation of rural medical care, pensions and other welfare systems have gladdened rural hearts.

Bamboo farmers are big beneficiaries of reforms to the forest right system, in bamboo growers' operation of bamboo plantations, investment into bamboo processing enterprises, in livelihood improvement and poverty alleviation. Now bamboo land and forests have been allocated to bamboo farmers, with their operation rights, usufruct and the right of disposal legally guaranteed for 50 to 70 years. The rights can be renewed and inherited.

As well as having land and forest, bamboo farmers also enjoy policy supports from central and local governments in the form of subsidies for creating bamboo plantations, bamboo operating and cultivating subsidies, loan subsidies, forest land mortgage loans, bamboo forest insurance subsidies, etc. These considerations make them willing to organize or join specialized bamboo cooperatives of their own accord or set up family workshops or small-scale processing enterprises, or cooperate with large corporations so that companies and bamboo farmers can develop, benefit and win together. In recent years, urban residents have higher incomes than before and they are keener than ever to spend part of that income on leisure travel to rural bamboo areas, to eat organic bamboo shoots and breathe in fresh air. As the city dwellers enjoy themselves there, bamboo farmers' incomes increase as a result.

However, China's bamboo farmers face or will face many problems as bamboo industry develops. First of all, due to imbalanced development of the urban and rural areas, many young people from the countryside leave to make their living in cities, and this gives rise to labor insufficiency. Farmers' rights and interests, especially those of vulnerable groups such as the young, the elderly and women, are yet to be protected. After the reform of the forest right system, scattered operation gave rise to small-scale and low-level operation of bamboo forest. Furthermore, the systems of specialized bamboo cooperatives and family forest are yet to be perfected. There is also the problem of forest area loss due to transfer of bamboo land and forest.

Cultural Ambassadors Enriching the Legacy of Bamboo Industry

In China's five millennia of culture, bamboo has always held a special place. For such a long time, bamboo has been part and parcel of Chinese life, in both material and spiritual aspects: eating bamboo shoots, living in bamboo houses, riding bamboo rafts, holding bamboo umbrellas, using bamboo brushes and paper, listening to bamboo music and reading bamboo slips, for example. About one thousand years ago, Su Dongpo, a distinguished poet of the Northern Song Dynasty, wrote these now familiar lines in praise of bamboo, "Man may go without meat, but cannot live without bamboo. Without meat he may get lean, without bamboo he will get vulgar." This is a fine example of bamboo's influence on Chinese culture.

In highly internationalized Beijing, there is a popular bamboo orchestra, a unique bamboo-themed park named Purple Bamboo Park, also Tanzhe Temple and Hongluo Temple where bamboos grow beside the winding paths, and master designers incorporating bamboo elements into theme exhibitions in Beijing Design Week. In the bamboo-rich province of Zhejiang, architects from 11 countries designed and constructed groups of bamboo buildings in different styles in Lishui City. Deep among mountain bamboo forests, intangible heritage practitioners in Fuyang still use traditional crafts to make bamboo paper for painting. Old people in Zhongtai Village make bamboo flutes and primary school teachers instruct children how to play the instruments. In Yong'an, Fujian Province, thousands of designers took part in a competition to design bamboo articles and visitors raved about the bamboo shoots banquet. Colorful bamboo arts, as illustrated by bamboo root carving in Jiangxi Province and woven bamboo pictures in Sichuan, enrich the cultural life of the people, as well as stimulating and expanding the bamboo culture industry.

In China, there are artists involved in bamboo music, bamboo painting, bamboo weaving, bamboo articles and bamboo architecture, and there are also folk bamboo craftsmen working in villages, workshops and in the streets. Their love and passion for bamboo culture drive forward the development of this millennia-old culture, to the benefit of all people.

However, Chinese bamboo artists and folk artisans cannot avoid the great impact of globalized modern culture and art. How, at the same time as preserving traditional bamboo culture, to absorb, integrate and innovate and thereby give it greater vitality and appeal is a new subject yet to be tackled.

Administrators Providing a Good Policy Environment

Some bamboo entrepreneurs say they prefer to be given good policies rather than financial support. This representative opinion illustrates that formulating favorable policy, and initiating and perfecting good management systems and mechanisms are vital for healthy and rapid development of the bamboo industry.

For quite a long time from the planned economy to the socialist market economy,

China has been a “big government and small market” country, where industries are highly dependent on the government, as demonstrated by the household saying “When you have a problem, look to the government to solve it.” Its good point is that, led by good policies and regulated by good systems and mechanisms, China’s bamboo industry has developed in a highly strategic and planned fashion. A case in point is the “Plan for the Development of China’s Bamboo Industry (2030)” made by the State Forestry Administration, which formulated forestry support policies jointly with the Ministry of Finance. Such policies enable the aggregation of resources to do major things such as strengthening major industries or leading enterprises. For instance, Zhejiang bamboo winding enterprises were supported in their establishment of the Center for Wound Bamboo Engineering Technology of the State Forestry Administration. The support policies also include protecting the interests of vulnerable groups such as bamboo farmers. The reform of the forest right system in bamboo areas of Fujian includes mediation of forest property disputes.

The Chinese government supports private bamboo enterprises in a variety of ways such as lenient but effective taxation and financial policies. The policies encompass loans, subsidies, taxes and insurance and many other aspects, which strengthen not only leading enterprises but also micro businesses and family workshops. The government also encourages and supports enterprises in opening up overseas markets.

An opposite side of the picture is that the reach of government regulation can be too wide or way too strict. Good news in this regard is the central government’s will and determination to further deepen the reforms of systems and mechanisms, key to which is the streamlining and delegation of powers. But this is no overnight job. It will take time for administrators at all levels to build and adapt bamboo industry regulatory systems and mechanisms with Chinese characteristics.

China’s bamboo industry has its own features, achievements and aims, and its development is the product of the dedicated commitment of hundreds of thousands of people involved with the bamboo industry. Their numbers include scientific and technological experts, entrepreneurs, artists, bamboo farmers and administrators. The 100 people selected in the book are representatives of the huge force working with bamboo. We hope they provide multi-perspective accounts of China’s bamboo industry and we may explore further and have more to share with the world.

Looking back on the gestation, writing, and revision of the 100 stories, from communication to finalizing, the authors are indebted to the many people involved.

First and foremost, we express our gratitude to the 100 heroes and heroines in the stories, who are the true faces of China’s bamboo industry. Their involvement varies: some conduct leading-edge research on bamboo and its utilization, some plan for the development of bamboo industry, some are dedicated to opening new markets for bamboo products, some tenderly raise and cultivate bamboo and bamboo forests

among mountains and fields, and some are inheritors of bamboo culture and art. Out of their love for bamboo, they took time out from their busy lives to give us the valuable themes and source materials for the writing of these one hundred stories.

Our thanks also go to *China Green Times*' reporters Ms. Chi Cheng and Ms. Ding Hongmei, Prof. Tie Zheng of Beijing Forestry University, Prof. Fan Baomin and Dr. Zhang Decheng of the Chinese Academy of Forestry, Ms. Yang Min of Fujian Yong'an Forestry Administration, Ms. Chen Qinjuan and Mr. He Qijiang of Hangzhou Academy of Forestry and other special contributors and contact persons, also to enthusiastic people in the bamboo industry for their attention, recommendations and support during the entire process of calling for and writing the stories. In the three-year process of writing, there were difficulties and problems aplenty, but the determined writing team persisted until every story was complete. The contribution written by Ms. Chi Cheng opens up the book, Ding Hongmei gave us kind support, Prof. Tie Zheng wrote elegantly, Dr. Fan Baomin and Dr. Zhang Decheng edited all the manuscripts, Ms. Yang Min and Mr. He Qijiang provided help locally and many more friends gave up their precious time and energy in way of liaison and coordination.... Their help is deeply appreciated.

Last but not least, we are thankful to Foreign Languages Press' editor-in-chief Hu Kaimin, deputy editor-in-chief Xu Rong and editor Ms. Yang Chunyan. We would also like to extend our thanks to Wang Xudong and Guan Cheng of our outreach team and other colleagues from INBAR for their support and help. Without them, the 100 stories could not have been successfully completed.

There are multitudes of moving stories with regard to the 30-year development of China's bamboo industry. But the time and the intensive labor required for this task means we can only include 100 representatives in this current volume. We will keep on watching China's bamboo industry, its bamboo villages and people related with bamboo, and, when another opportunity arises, write more excellent stories about China's bamboo industry. To this end, we invite all those who love and care about bamboo, industry insiders or otherwise, to share their stories with us.



Dr. Li Zhiyong Dr. Wu Junqi
The editors



Contents

1 **Bamboo Experts**

3 **Leader of China's Bamboo Industry**

Madam Jiang Zehui, vice chair of the Committee of Population, Resources and Environment of the CPPCC, co-chair of INBAR Board Trustees, director general of the International Center for Bamboo and Rattan, academician of the International Academy of Wood Science, and chief scientist of the Chinese Academy of Forestry

7 **Adding Scientific Weight to China's Bamboo Industry**

Professor Zhang Qisheng, academician of the Chinese Academy of Engineering, Ph.D. advisor at Nanjing Forestry University, and former president of Zhejiang Agriculture and Forestry University

10 **A Great Scientist's Affection for Bamboo Culture**

Professor Peng Zhenhua, chief scientist of the Chinese Academy of Forestry

13 **Years' Commitment to Bamboo Cultivation**

Professor Fu Maoyi, chief scientist of the Chinese Academy of Forestry, council member of the Chinese Society of Forestry, and vice chairman and secretary-general of the Chinese Society of Forestry's Bamboo Division

16 **Pursuing the Dream: Making Bamboo a Perpetual Source of Wealth**

Professor Xiao Jianghua, chief scientist of the Chinese Academy of Forestry

19 **Making Bamboo Enterprises More Competitive by Promoting Industry Standards**

Professor Fei Benhua, executive deputy director general of ICBR, and chief expert of the Research Institute for Bamboo and Rattan, ICBR

22 **Academicians Help Double the Bamboo Utilization Rate**

Professor Wu Yiqiang, academician of the International Academy of Wood Science and vice president of the Central South University of Forestry and Technology

- 25 A Leader in Bamboo Carbon Sink Research**
Professor Zhou Guomo, president of Zhejiang Agriculture and Forestry University
- 28 Tech Breakthroughs Cause Bamboo Products to Soar in Value**
Professor Yu Wenji, director of the Research Center of Engineered Bamboo Materials, Chinese Academy of Forestry
- 31 Dedicated to Improving People's Wellbeing Through Bamboo**
Professor Yang Yuming, former president of Yunnan Academy of Forestry
- 34 A Persistent Explorer of Bamboo and Rattan Classification**
Professor Wang Kanglin, director at the Green Resource Research Center, Southwest Green Development Research Institute of Southwest Forestry University
- 37 Lab Among the Bamboos**
Dr. Fan Shaohui, director and chief expert of the Research Institute of Bamboo and Rattan Resources and Environment, ICBR
- 40 A Successful Pioneer of Engineered Bamboo**
Professor Wang Zheng, chief expert of the Research Institute of Wood Industry, Chinese Academy of Forestry
- 43 Exploring the Mysteries of Bamboo Genetics**
Professor Gao Zhimin, chief expert of ICBR
- 46 The Simple Sentiments of a Bamboo Craft Master**
Mr. Liu Jun, chief designer of Urban Complex Design and Research Center, Architectural Design and Research Institute of Tsinghua University
- 49 China's First Doctorate in Bamboo Charcoal**
Professor Zhang Wenbiao, Zhejiang Agriculture and Forestry University
- 52 Pioneer of Research into Comprehensive Utilization of Bamboo Biomass**
Professor Zhou Jianbin, Nanjing Forestry University

- 55 Molecular Studies Explain the Advantages of Bamboo Materials**
Professor Yu Yan, deputy director of the Key Open Laboratory on Bamboo and Rattan Science and Technology of the State Forestry Administration, and chief expert of ICBR
- 57 Using Bamboo in House and Bridge Construction**
Professor Xiao Yan, dean of the College of Civil Engineering, Nanjing Tech University
- 60 Dedicated Research on Bamboo Development and Utilization**
Dr. Wang Ge, research fellow, ICBR
- 63 “The Present-day Cai Lun”**
Dr. Fang Guigan, deputy director general of the Forest Products Chemical Industry Research Institute of the Chinese Academy of Forestry, and academician of the International Academy of Wood Science
- 66 Promoting Ornamental Bamboo for Landscape Gardens**
Professor Chen Qibing, dean of the College of Landscape Architecture of Sichuan Agricultural University and deputy director of the Bamboo Division of the Chinese Society of Forestry
- 69 Dr. Jiang and Team Help Upgrade Bamboo Industry in Mountain Areas**
Dr. Jiang Jingyan, President of Yong’An Institute of Bamboo Industry (YIBI)
- 72 Bamboo Instills New Life into Architecture**
Mr. Wang Gang, chief architect of Urban Element (Beijing) International Architectural Design Co., Ltd.
- 74 Bamboo Industry, a Perennial Blessing to Humankind**
Professor Zhang Ying, College of Biosystems Engineering and Food Science, Zhejiang University
- 76 In Search of the Functional Genes That Form Bamboo Colors**
Professor Wang Juan, director of the Key Laboratory of the State Forestry Administration for the Protection and Cultivation of Rare or Endangered Forestry Plants in Yunnan Province, Yunnan Forestry Academy

79 **Three Decades in Information Services**

Ms. Zhang Xinping, editor-in-chief of *World Bamboo and Rattan*, and associate professor of RIFPI, Chinese Academy of Forestry

82 **Bamboo Entrepreneurs**

84 **Bamboo Winding Composite Technology Opens Up New Ground**

Mr. Ye Ling, chief engineer and president of Zhejiang Xinzhou Bamboo Winding Composite Technology Co., Ltd.

87 **Babo, the First Bamboo-Fiber Household Paper, Comes of Age**

Mr. Zhou Jun, vice chairman of Chengdu Vanov Industrial Fabrics Group Co., Ltd.

90 **Pioneer of Bamboo Blades in Wind-Power Generation**

Mr. Du Yingzhuo, general manager of Beijing Khan Wind Technology Co., Ltd.

93 **Bamboo Keyboard Innovation**

Mr. Feng Xuquan, general manager of Jiangxi Tonggu Jiangqiao Bamboo & Wood Co., Ltd.

96 **From Designing Ships to Designing Bamboo Crafts**

Mr. Zeng Weiren, international master of arts and crafts, master of traditional Chinese crafts, and senior landscape designer

99 **Bamboo Packing Proves Its Worth in Industrial Cooling**

Mr. Lu Jiping, general manager of Hengda Environmental Protection Co., Ltd.

101 **Committed to Mass Standardized Production of Bamboo Furniture**

Mr. Zhou Songzhen, chairman of Zhejiang Jiuchuan Bamboo and Wood Co., Ltd.

104 **Using Bamboo to Weave Art and Wealth**

Mr. Chen Yunhua, inheritor of national intangible cultural heritage, a Sichuan master of bamboo weaving, Qingshen Yunhua Bamboo Tourism and Culture Co., Ltd.

107 **International Success for a Daring Entrepreneur**

Mr. Lin Hai, chairman of Dasso Industrial Group Co., Ltd. in Zhejiang

- 110 From Bamboo Flooring to Bamboo Home Furnishing**
Mr. Chen Yongxing, chairman of Zhejiang Yoyu Bamboo Joint-Stock Co., Ltd.
- 113 Opening Up Applications for Bamboo**
Mr. Ruan Jianrong, president of Shanghai Jiarong Construction Engineering Co., Ltd.
- 116 The Man Who Converts Bamboo into “Black Gold”**
Mr. Chen Wenzhao, chairman of Wenzhao Bamboo Charcoal Company and curator of the China Bamboo Charcoal Museum
- 119 Yu Yan’s Success as an Entrepreneur**
Ms. Yu Yan, general manager of Fujian Heqichang Bamboo Co., Ltd.
- 122 Opening Up the World of Ornamental Bamboo**
Mr. Yu Zaiding, general manager of Yangzhou Dayu Ornamental Bamboo Garden
- 125 Careful Nurturing of “GREEZU”**
Mr. Xiong Xiaohong, president of Jiangxi GREEZU Bamboo Development Co., Ltd.
- 128 “Internet Plus” Helps the Bamboo Industry Grow**
Mr. Lin Qi'en, chairman of Fuzhou Xinxing Household Products Co., Ltd.
- 131 From Bamboo Mats to All-bamboo Furniture**
Mr. Zhong Sanming, president of Jiangxi Kangtilong Bamboo Industry Co., Ltd.
- 134 From Outsider to an Expert on Bamboo Furniture**
Mr. Xu Mingqiang, president of Fujian Jiejietong Bamboo Furniture Science and Technology Co., Ltd.
- 137 Pushing Bamboo Fiber as a Green Alternative to Cotton**
Mr. Li Zeping, chairman of Zhuyixuan Home Textile Co., Ltd.
- 140 Frontrunner in Bamboo Fiber Textiles**
Mr. Yang Qiuliang, president of Hunan Oulinya Garment Co., Ltd.
- 143 A Wonderful Life in a Bamboo Craft Museum**
Mr. Lu Junqian, curator of the Mingjiang Bamboo Craft Museum, Fujian Province

146 Building Dreams with Bamboo

Mr. Wang Shuchun, president of Sichuan Lüye Landscape Co., Ltd.

149 A Villager's Invention for Peeling Bamboo Shoots

Mr. Zhou Jindi, Lijia Village, Tonglu County, Zhejiang Province

152 A Bamboo Board "Star" Arrives from the Mountains

Mr. Tao Zongjing, general manager of Huachang Bamboo Industry Co., Ltd., Yong'an City, Fujian Province

155 How Outdoor Bamboo Scrimber Flooring Came into Being

Mr. Yin Yijian, chairman of Fujian Yong'an Youzhu Bamboo Co., Ltd.

158 A Young Returnee Entrepreneur's Bamboo Further-processing Chain

Mr. Gao Yuan, Anhui Hongxin Bamboo Corporation

161 Opening Up the Market for All-bamboo Skateboards

Ms. Zhang Limin, general manager of Fujian Yong'an Minxing Sports Goods Co., Ltd.

164 Special Star Group's Domain of Bamboo

Mr. Liu Xiaojun, president of Chongqing Special Star Internal Door Set Group Co., Ltd.

167 Cultural Envoys

169 An Ink Painting Artist's Love for Bamboo

Mr. Huang Yonggang, deputy director of the Chinese Bamboo Ink Painting Culture Association, bamboo ink painting specialist

172 From Entrepreneur to Bamboo Carving Connoisseur

Mr. Xia Xianchong, curator of Zhuyuntang Bamboo Carving Museum

175 A Life in Bamboo Culture

Mr. Lan Xiaoguang, chief engineer of Zhejiang Forestry Administration

- 178 From Jewelry Designer to Ambassador for Bamboo Culture**
Mr. Jeff Da-yu Shi, founder and chief creative officer of the Dragonfly Design Center
- 181 Curator of the International Bamboo Architecture Biennale**
Mr. Ge Qiantao, a well-known Shanghai artist, curator, and visiting professor of Guangzhou Academy of Fine Arts
- 184 Inheritor of Traditional Bamboo Papermaking**
Mr. Li Wende, representative inheritor of intangible cultural heritage (bamboo paper making) in Hangzhou
- 187 Founder of the World Renowned Bamboo Orchestra**
Mr. Wang Wei, head of the Beijing Bamboo Orchestra
- 190 Life Lessons from Bamboo**
Mr. Chen Guoping, principal of Duishi Primary School, Zhejiang Province
- 193 Smart Design Brings Magic to Bamboo Furniture**
Mr. Zhu Liqun, founder and art director of "Bamboo Belief"
- 195 An Artist Engraver of Ancient Script on Bamboo**
Mr. Chen Zhixian, a master craftsman of bamboo engraving
- 198 A Master Craftsman's Predestined Love for Bamboo Umbrella**
Mr. Wen Dehan, inheritor of bamboo umbrella, an intangible cultural heritage item
- 201 Weaving Dreams, Inheriting Bamboo Artistry**
Mr. Zhang Deming, inheritor of national intangible cultural heritage — Qingshen Bamboo Weaving
- 204 Half a Century of Devotion, But Who Will Take Over?**
Mr. He Minwen, inheritor of bamboo weaving in Fujian Province
- 207 Forty Years Spent Reviving Suzhou Bamboo Carving**
Mr. Li Zongxian, representative inheritor of Suzhou bamboo carving

210 Carrying On the Tradition of Bamboo Poem Drawing

Mr. Wu Xu, a Henan master of bamboo poem drawing

213 A Disabled Bamboo Engraver with Great Ambitions

Mr. Fang Miaoxin, a bamboo engraver from Baizhang Town, Hangzhou, Zhejiang Province

216 The All-bamboo Shoot Banquet

Ms. Ye Meilan, founder of Yong'an's unique bamboo banquet

218 A Cup of Bamboo Wine, a Marvelous Tale

Mr. Zhu Tianhu, chairman of Sichuan Huozhiniang Bamboo Wine Co., Ltd.

221 Designer and Creator of a Bamboo Information Sharing Platform

Mr. Chen Hao, Nanjing Bamboo Media & Culture Co., Ltd.

224 “Feng the Bamboo Carpenter” Returns Home and Starts a Business

Mr. Feng Guangjun, an arts and crafts master of Chongqing

227 A Bamboo Flute Master from the Homeland of Bitter Bamboo

Mr. Dong Zhongbin, a bamboo flute master from Zhongtai in Zhejiang Province

230 The Founder of Bamboo Husk Carving

Mr. Wen Yuguang, a master of arts and folk crafts of Chongqing

233 An Ordinary Old Man with an Extraordinary Bamboo Carving Career

Mr. Wang Shihui, an arts and crafts master in Hunan

235 Bamboo Farmers

237 Leading Bamboo Farmers to Prosperity

Mr. Jiang Changfu, a national model worker from Chongyang Village, Lin'an, Zhejiang Province

- 240 Leading a Disadvantaged Group into Entrepreneurship Through Bamboo Weaving**
Ms. Wan Xue, a master weaver of the Banzhu Bamboo Arts Co., Ltd. in Gaoping District, Nanchong City, Sichuan Province
- 242 Conjuring Art from Waste Bamboo**
Mr. Zhou Guixin, a bamboo carving craftsman from Dongyang
- 245 Sixty Years of Crafting Bamboo**
Mr. Yuan Guanwen, a bamboo craftsman of Sichuan
- 248 A Bamboo Craftsman and His Bamboo Bike**
Mr. Yu Yunsheng, a bamboo craftsman of Chun'an, Zhejiang Province
- 251 Scientific Cultivation of Bamboo Shoots Puts Growers on the Road to Riches**
Ms. Liu Caifeng, leader of the Lüfeng Bamboo Shoot Specialist Cooperative of Hangzhou, Zhejiang
- 254 Weaving a Beautiful Life with Bamboo**
Ms. Yao Youfeng, head of Guizhou Libo Maolan Karst Specialist Bamboo Crafts Cooperative
- 257 A Willing Learner in the Leizhu Business**
Mr. Tong Miaosheng, a bamboo farmer of Fenshui Town, Tonglu County, Zhejiang Province
- 260 From Farmer to Bamboo Shoot Boss**
Mr. Jiang Daihai, general manager of Wangtong Bamboo Shoot Co., Ltd. of Yong'an, Fujian Province
- 263 A Disabled Youth's Road to Entrepreneurship**
Mr. Wang Jianwen, director-general of Wuming Moso Bamboo Cooperative in Anfu County, Jiangxi Province
- 266 The Bamboo Path to Prosperity**
Mr. Lin Zhaoying, a villager from Houlou Village, Yangzhong Town, Youxi County, Fujian Province
- 269 Bamboo: a Source of Family Prosperity**
Mr. Huang Engui, a villager of Tianqiao Village, Datong Township, Chishui, Guizhou Province

272 Bamboo Administrators

274 The Top Bamboo Garden in North China

Mr. Cao Zhenqi, head of the Zizhuyuan Park in Beijing

277 A Pioneer of Bamboo Forest Carbon Sinks

Dr. Li Nuyun, secretary-general of the China Green Carbon Foundation

280 Planning from the Top to Encourage Pursuit of the Bamboo Dream

Mr. Chen Jiawen, director of the Department of Development Planning and Assets Management of the State Forestry Administration

283 Cooperative Shoots Its Way to Prosperity

Mr. Jiang Yingjun, chairman of Shuanglian Bamboo Shoots Cooperative, Yong'an, Fujian Province

286 Sci-Tech Promoter in the Land of Bamboo

Mr. Xia Genqing, chief engineer of the Forestry Bureau of Jiande City, Zhejiang Province, chief bamboo promoter of Jiande City

289 A Civil Servant Dedicated to Yong'an's Bamboo Industry

Mr. Li Lusong, director of the Yong'an Forestry and Bamboo Industry Development Bureau, Fujian Province

292 The Entrepreneurial Path of a Bamboo Village Leader

Mr. Shao Xiaoping, leader of Fude Village, Chun'an County, Zhejiang Province

295 An "Indigenous Expert's" Tricks of the Trade

Mr. Yang Guosong, a villager of Longgong Village, Yong'an City, Fujian Province, and an "indigenous expert" in bamboo cultivation

298 Years of Service as "Chief Bamboo Engineer"

Mr. Wang Anguo, chief engineer of the Forestry Bureau of Lin'an City, Zhejiang Province

301 Bamboo Industry Association Promotes the Healthy Development of Yong'an's Bamboo Incense Stick Industry

Mr. Liu Wengui, secretary-general of the Bamboo Incense Stick Chapter of the Yong'an City Bamboo Industry Association, Fujian Province

Bamboo Experts

In 2006, China put forward the scientific and technological development goal of building China into an innovative country, strengthening independent innovation capability as the key component for adjusting industrial structures and shifting the mode of growth. So, innovation of bamboo science and technology is an important choice for further enhancing the development of China's bamboo industry and its international competitiveness. People playing an assiduous part in such innovation are three generations of scientists, the backbone veteran and middle-aged researchers and their young followers, who all fulfill their responsibilities conscientiously and with selfless dedication.

The older generation is the main pillar. Professor Jiang Zehui, academician of the International Academy of Wood Science and chief scientist of the Chinese Academy of Forestry, is an internationally renowned forestry scientist. She is committed to the development and utilization of wood materials and bamboo engineering materials, and has made significant achievements and won a raft of influential patents. She is also a well-known forestry strategist, making important and decisive contributions to strategy formulation, forest accounting, and research on ecological and cultural systems in China's sustainable development of forestry. Her achievements are quite influential worldwide. Professor Zhang Qisheng, academician of the China Academy of Engineering, is China's pioneer in research on bamboo's industrial uses and has won seven national awards in science and technology in bamboo, bamboo composites, etc. Professor Peng Zhenhua, chief scientist of the Chinese Academy of Forestry, has made indelible contributions to research on bamboo gene maps, urban forestry and bamboo culture. Fu Maoyi, Xiao Jianghua, Yang Yuming and other older scientists also play leading roles in bamboo and rattan science and technology.

Middle-aged experts like Fei Benhua, Yu Wenji and Xiao Yan are the backbones of the bamboo innovation force. Considering the current historical background,

the middle-aged intellectuals are highly aware of their great responsibility in the cause of reform and socialist construction. In order to fulfill their mission, they defy the hardships, setbacks and even failures that they have all experienced and exert their utmost in their researches on bamboo. They fought victoriously over severe or prolonged setbacks and pressures, emerging as successful achievers in bamboo science and technology. Fei Benhua, who has recently become chairman of ISO (International Standardization Organization) Committee on Bamboo and Rattan Technology, has reaped many fruits in bamboo and bamboo technical standards. Yu Wenji and his research team have developed technology for efficient utilization of high-performance bamboo-based fiber composites, breaking through a key impediment to bamboo industry development. Xiao Yan and his team have designed a new modern bamboo structure, which has been widely used in various fields. Among the high-achieving middle-aged group are Wu Yiqiang, Wang Zheng, Fang Guijian, Chen Qibing, Fan Shaohui, Wang Kanglin and Zhou Jianbin, just to name a few.

Young experts are quickly becoming backbone bamboo experts. They grew up at a good time when most of them could attain an MA or PhD degree and quite a number of them often go on academic trips for research collaboration in China and abroad. Dr. Gao Zhimin has made achievements in bamboo genes, bamboo resources, bamboo breeding and so on. Wang Juan is China's pioneer in the study of functional genes of important bamboo traits. Led by Dr. Wang Ge, his team invented the split yarn technology of textile bamboo fibers (raw bamboo fibers) and the textile processing technology of optimizing raw bamboo fibers. Dr. Jiang Jingyan was introduced as an innovative talent to Yong'an City, Fujian Province where she set up the Yong'an Institute of Bamboo Industry. Dr. Yu Yan and Dr. Zhang Wenbiao made many technological innovations in bamboo materials and bamboo charcoal respectively.

With government support and conditions favorable for sci-tech innovation, greater market demand for innovation, and an ever-expanding team of innovators, the future for sci-tech innovation in China's bamboo industry definitely looks bright.

Leader of China's Bamboo Industry

Madam Jiang Zehui, vice chair of the Committee of Population, Resources and Environment of the CPPCC, co-chair of INBAR Board Trustees, director general of the International Center for Bamboo and Rattan, academician of the International Academy of Wood Science, and chief scientist of the Chinese Academy of Forestry



China is the kingdom of the bamboo plant in its many varieties, but the true rise of China's bamboo industry began only in the last 20 years.

What is it driving the meteoric rise of China's bamboo industry? Among many possible answers, three organizations constitute a powerful development engine. Their contribution to the Chinese bamboo industry will go down in history. They are: The International Network for Bamboo and Rattan (INBAR, renamed International Bamboo and Rattan Organisation since July 2016), the International Center for Bamboo and Rattan (ICBR) and the China Bamboo Industry Association (CBIA).

Professor Jiang Zehui, an important champion, promoter and leader of these three bodies, has put her heart and soul into their establishment and development.

China-led INBAR Puts Bamboo and Rattan in the Spotlight

November 6, 1997 was a day to be remembered in the annals of bamboo and rattan. It was the day of INBAR's official establishment.

The official inception of INBAR, the first intergovernmental organization to be headquartered in China, came with the signing of the INBAR Establishment Agreement in the majestic Great Hall of the People in Beijing. A delighted and grateful Professor Jiang traced the hard path leading to the assembly of people there. In 1995, the idea of establishing an international center for bamboo research, INBAR, was recommended. China offered to provide the headquarters for the new international organization and the offer was discussed and accepted by the First Multilateral Negotiation Meeting in September. On November 14, diplomat Keith Bezanson, president of Canada's International Development Research Centre (IDRC), wrote to the Government of China regarding the subsequently endorsed agreement. On behalf of the Chinese government, State Councilor Song Jian endorsed the headquarter agreement and INBAR was finally formally approved by the Chinese

government. The China-INBAR Preparatory Leading Group was formed in March 1996, headed by Jiang Zehui. It was a new and complex challenge for all its members, involving 22 months of discussions with Chinese ministries and departments, direct discussions and communication with international coordinating agencies, engaging in multilateral and bilateral discussions. The end result was the formal establishment of INBAR.

Professor Jiang was elected co-chairperson of INBAR. Supported by the Chinese government, in INBAR, she has done effective work in partnership with member countries and development partners, supporting their efforts to develop bamboo and rattan and to breathe new life into these millennia-old resources.

During the last two decades, INBAR has developed from an international research organization to an international development organization operating widely and energetically to alleviate poverty, protect the environment and support green development and to a champion of bamboo and rattan culture and a pioneer of inclusive green development.

Since INBAR's birth in 1997, more countries have joined the original nine member states, bringing the current membership to 42 in 2016. INBAR's global program is coordinated from its secretariat in Beijing and is put into action through national and regional offices in Ecuador, Ethiopia, India and Ghana. INBAR has over 130 partners worldwide. It has run projects and programs in most bamboo and rattan producers and consumers in Asia, Africa, Latin America, North America, Europe and Oceania.

INBAR's influence is constantly expanding as a key intergovernmental organization. It is playing an increasingly important role in sustainable development and other related fields on the stages of environment, government and economy.

ICBR Brings Lifts to the Bamboo and Rattan Industry Through Technology

ICBR has been called the world's top institute for bamboo and rattan research. And that is no more than the truth.

Professor Jiang describes ICBR as a non-commercial national research center dedicated to technological innovation, with the important mission of protecting and restoring habitat in China alongside developing the bamboo and rattan industry.

ICBR is a research, administration and training support center with focus on bamboo and rattan research. Its tasks are to support and assist INBAR in fulfilling its mission, to promote international scientific cooperation and exchange on bamboo and rattan, to foster senior professionals in the related areas, to establish a modern international bamboo and rattan scientific and technological information network, and to provide bamboo and rattan training and services for INBAR member states.

ICBR has performed its mission well. In addition to undertaking many National

Science & Technology Pillar Programs and international cooperation projects, it has made major breakthroughs; ICBR has made remarkable achievements in other areas too, such as development of basic platforms, cooperation and exchange, industrial development, and training of experts.

At the helm of ICBR, Professor Jiang is gratified by the great achievements made.

In addition to heading ICBR, Professor Jiang is a world famous scientist in her own right. She has chaired and participated in elements of the National Climbing Program, the National 973 Project, the National 863 Project, the National Natural Science Foundation of China, and the GEF (Global Environment Facility) Project. She also had key projects in the National Science & Technology Pillar Program during four Five-year Plan periods and Special Funding for Research in the Public Interest, resulting in a raft of achievements and patents that have had a positive impact in China and overseas.

As far back as in 1999, Professor Jiang was voted a fellow of the International Academy of Wood Science (IAWS). In 2013, she was presented the IAWS Distinguished Service Award for her work in all areas of wood science and especially in advancing international programs throughout the world. It was the very first Distinguished Service Award given by IAWS and Professor Jiang was the first fellow of IAWS to receive it.

After establishing the organization, the focus of Jiang Zehui's work shifted to research on bamboo and rattan material technology. She and her team set to work looking into the development and applications of engineered bamboo materials, in particular bamboo structure and performance, and into the protection of bamboo, and value-added use of bamboo. In 2002, Professor Jiang was chief editor of the bilingual (Chinese and English) publication *Bamboo and Rattan in the World*. This compendium is an important reference work on bamboo and rattan, and provides comprehensive information on the features and applications of Chinese bamboo and rattan. In 2006, Professor Jiang's team won the top prize in the National Technology Progress Award for their project "Research and Demonstration of Key Manufacturing Technology of Engineered Bamboo Materials."

Professor Jiang enthusiastically advocates "replacing wood with bamboo," processing China's rich bamboo resources into engineered materials to be used instead of quality timber, and thereby protecting precious forestry resources. It is of great significance for China's forestry industry and environmental protection.

Currently, Professor Jiang, as Director General and Principal Scientist of ICBR, also heads the Technical Committee on Bamboo and Rattan of the International Organization for Standardization (ISO TC/296). This has started the process of setting international standards for bamboo and rattan, and will be a major contributor in raising the level of development in these industries including China's, and in improving their competitiveness.

Promoting Bamboo Culture

As she says, “No other plant has had such an influence on Chinese culture as bamboo.” Over the course of Chinese history, the “bamboo spirit” has become absorbed into China’s cultural bloodstream. It is part of Chinese thinking, religion and esthetics. Currently, China’s bamboo culture is on the rise and it is evolving in step with the development of modern society, taking on new connotations and new life.

Twenty years ago, it was this consideration that prompted Jiang Zehui, having vigorously promoted the establishment of CBIA, to push for the China Bamboo Culture Festival. The inaugural festival took place in Anji, Zhejiang Province, and it has been held nine times in different cities since then.

The festivals have kept on getting better and better, more serious and relevant with richer content and forms. Each event is something new, a gathering of the international bamboo community, a mixing of ancient and modern bamboo culture, a cornucopia of technology and products. Above all, it is a chance to share know-how and to spark off new ideas.

No matter how busy her schedule, Jiang Zehui stays deeply involved with the festival arrangements, right from the outset through to the closing ceremony. She and her co-editor, Professor Peng Zhenhua, spent two years collecting 10,000 ancient Chinese poems about bamboo from the ancient pre-Qin period to the Qing Dynasty, and publishing in *The Charm of Bamboo*. In order to give people globally an understanding of what bamboo means to the Chinese, one hundred of these poems were selected, translated into English, and juxtaposed with old paintings of bamboo for publication in a bilingual format — Chinese-English collection *The Charm of Bamboo — 100 Selected Ancient Chinese Poems on Bamboo*.

Perhaps these lines from a Song Dynasty poet are the most fitting reflection of Jian Zehui’s feelings for bamboo and rattan: “Integrity, even before emerging from the earth; modesty, even when piercing the clouds.”

Adding Scientific Weight to China's Bamboo Industry

Professor Zhang Qisheng, academician of the Chinese Academy of Engineering, Ph.D. advisor at Nanjing Forestry University, and former president of Zhejiang Agriculture and Forestry University



The fact that China's bamboo industry has long been in the world's top ranks has much to do with its abundant bamboo resources; another more important reason is that a group of scientists decided on bamboo research as a lifetime career, and overcame multiple challenges. One such scientist is Academician Zhang Qisheng. Unfortunately, Mr. Zhang passed away before the publication of this book. But his achievements and contribution to the bamboo industry will always be remembered.

From Childhood Love to Research Object in Adulthood

Zhang Qisheng's ties with bamboo go back to his early years. He was born in 1939 in a small mountain village in Chun'an County, Zhejiang Province. Zhejiang being a center of China's bamboo industry, his home area was swathed in bamboo forests in every direction. Bamboo was part of Zhang's life from Day One. But fate seems always to test through hardship those who ultimately go on to success, as evidenced by Zhang Qisheng's experience. When Zhang was just eight years old, his father died, leaving his mother to raise their six children alone. Zhang Qisheng, visited too early by life's hardships, found companionship among the bamboo forests, pouring out his sorrows and worries. But he also learned the importance of industriousness and to cherish what he had. The figure of his mother toiling to keep them alive and the bamboo forest where he could play and relax made the deepest impression on him.

In 1956, when graduating from senior high school and applying for college, this mountain boy determinedly chose an unpopular specialty — wood machining, with the sole intention of making the best use of the woods back home. After completing a systematic study of the profession, Zhang Qisheng stayed on to teach and do research in wood processing technology.

In 1979, Zhang Qisheng led his students to Yixian County in Anhui Province on a field trip. Looking at the luxuriant bamboo forest around the county, the then leader

of the county sighed with emotion, saying to him, “Professor Zhang, wood supplies are getting scarcer, but if you could help us put all this vast amount of bamboo into use, it would be a great contribution!” Soon after returning to school, Zhang Qisheng made the major decision to switch his research direction from wood to bamboo. He was 40 years old that year. He made a vow that he would use bamboo to help bamboo farmers lift themselves out of poverty.

Using Bamboo to Substitute and Combine

To a layman, there seems little difference between wood and bamboo, but as an expert, Zhang Qisheng is well aware of the issues. Compared with wood, bamboo has weaknesses such as small diameter, thin wall and hollow center. Furthermore, its starch and sugar content makes it subject to mildew and pest damage. The existing wood processing machinery and technology could not be directly applied to bamboo. For thousands of years, in different countries around the world, utilization of bamboo stagnated at the primary stage of raw bamboo use and bamboo strip weaving. Consequently, unlike wood, bamboo failed to be widely developed. None of this shook Zhang’s resolve. He was convinced that, through deep processing, bamboo could become a resource to enrich the people, and that replacing wood with bamboo was by no means impossible.

In the course of his bamboo research, the first problem to be overcome was one that the entire world faced, namely, the high-temperature softening and flattening of bamboo. Zhang Qisheng began his arduous exploration of how to take bamboo, a small-diameter, thin-walled, hollow material that is prone to splitting across its circumference and transform it into a wide, high-strength and non-deforming board. After many experiments, he finally found the best method to achieve the optimum combination of temperature, humidity and pressure. The technical difficulties overcome, applications awaited. Before long, a series of bamboo products emerged, among them bamboo plywood, high-strength coated bamboo plywood, bamboo particle board, bamboo-wood composite container flooring, and bamboo-wood laminated veneer lumber. China’s bamboo processing industry began to emerge.

Zhang Qisheng’s study of bamboo-wood composite board deserves mention. In 1995, he proposed the idea that bamboo-wood composite structure is an effective way to the scientific and rational use of bamboo resources. Applying lamination theory, he had bamboo and wood processed into different sizes before allocating them in proportion to different parts of the board to produce bamboo-wood composite boards, the finished product combining the respective strengths of bamboo and wood, while avoiding their weaknesses. It provided a solid theoretical basis for the design and development of bamboo-wood composite structure products. For 17 years, Zhang Qisheng trod the path of substituting bamboo for wood toward creating bamboo-wood composite.

A Lifelong Non-Quitter

A pioneer in the research of the industrial utilization of bamboo, Zhang Qisheng persists in scientific and technological innovation. Overcoming multiple difficulties on the way, he developed, in this order, bamboo plywood for platform floors of trucks and buses, bamboo plywood formwork for construction, bamboo particle board, bamboo-wood composite container flooring, bamboo-wood laminated veneer lumber, bamboo charcoal, and bamboo vinegar. He has won seven national science and technology awards, published eight monographs (including translations) and more than a hundred papers.

Not content to confine himself to academic research, Zhang also thought about how to combine academic achievements with industrial development for effective productivity. His research stimulated the establishment of many bamboo processing enterprises, via which bamboo products have been applied in more fields. Hence, he has made an indelible contribution to the formation and development of bamboo processing in China.

In 1997, Zhang Qisheng was elected Academician of the Chinese Academy of Engineering and appointed as professor and doctoral supervisor by Nanjing Forestry University. From June 2000 to December 2008, he served as president of Zhejiang Forestry College, and then honorary president of Zhejiang Agriculture and Forestry University and vice chair of the China Bamboo Industry Association. Today, in the laboratory, workshop and on the hilltop, you can still see the cordial and familiar figure of Zhang Qisheng, this major contributor to the development of China's bamboo industry.

A Great Scientist's Affection for Bamboo Culture

Professor Peng Zhenhua, chief scientist of the Chinese Academy of Forestry



Opening the exquisitely produced poetry collection, *The Charm of Bamboo*, it is hard to imagine that this classic on Chinese bamboo culture could have been authored by a famous scientist. The achievements of Professor Peng Zhenhua, late chief scientist of the Chinese Academy of Forestry and doctoral tutor, entitle him to a permanent place in the research history of Chinese bamboo culture. Although Prof. Peng has passed away, his great contribution to bamboo industry has always been enshrined in our hearts.

The Essence of Bamboo's Great Charm

We are accustomed to great things from Professor Peng, winner of the first-class Liang Xi science prize, his various achievements in forestry research and his brilliant credentials. After obtaining a vice-doctorate in forestry in the Soviet Union (currently Russia) in 1964, he returned to China to embark on a lifetime of applying his forestry expertise and other knowledge that he had learned abroad.

He was a pioneer in ushering in the use of nuclear energy in forestry and achieved outstanding results in areas such as genetic breeding, irradiation of plants and flowers and the variation of properties of vegetatively propagated timber species of different provenances and populations. These accomplishments won him countless honors. Among these are: "National Excellent Returned Talent" in 1995, "Outstanding Contributor to the Ninth Five-Year National Research Program" in 2001, "National Outstanding Expert Professional" in 2002, and "One of the Top Ten Talents of the Country" in 2004.

So why should such a successful forestry scientist turn his interest to Chinese bamboo culture when he was already in his seventies?

Compared with the length of his career in scientific research, the time Professor Peng spent studying in field of bamboo culture is by no means long, but surely his

life of science, a life of rigorous scholarship and tenacious wrestling with scientific problems, embodies the very spirit of bamboo. It was precisely these years of single-minded research that brought his 60-year career to a beautiful culmination, his deep understanding and profound interpretation of bamboo culture that brought his lifelong dedication to science to a brilliant high point.

Professor Peng entered the wonderland of bamboo culture with scientific knowledge amassed over a lifetime and a passion for the natural environment.

Of all the Chinese plants and flowers that symbolize beauty, nobility and refinement, bamboo is preeminent. Drawn by the broad span and profundity of bamboo culture, Professor Peng would always marvel at the splendor of China's bamboo civilization. In history, no other plant has exerted a greater influence on human civilization than bamboo. It is small wonder that China is seen as "the country of bamboo civilization."

Chinese bamboo culture cannot be separated from a group of wits in history that sang the praises of bamboo and compared themselves to it. They were special intellectual grouping and a phenomenon unique to China. Professor Peng made a painstaking study of them and the spirit of bamboo that they personified.

The Chinese people's love and veneration of bamboo stem not so much from its out-of-the-ordinary characteristics and symbolism as from its philosophical significance in Chinese culture. It is this very spirit that constitutes the link between Professor Peng's scientific research and his study of bamboo culture.

The Historical Charm of Bamboo in a Single Volume

As the only book to give a comprehensive description of bamboo culture, *The Charm of Bamboo* represents the essence of modern Chinese bamboo culture and is the crowning achievement of Professor Peng's research in this area.

He started this huge project in 2002, envisaging that two years would be ample to gather and sort out the material. He was wrong. When he really got going, he was amazed by the breadth and profundity of our bamboo culture.

The Charm of Bamboo was released in 2006 at the fifth Chinese Bamboo Culture Festival.

It falls into three parts: "Etymology of Words," "Beautiful Poetry and Prose" and "Illustrated Pictures," and contains 10,000 poems, spanning the entire recorded history of China, from mythical antiquity and pre-Qin times, through the dynasties from Han and Tang down to Ming and Qing. This master work won the third Liang Xi Award for Books and Journals on Forestry and has been presented as an official gift to foreign friends on many occasions, thus becoming a symbol of Chinese bamboo culture.

In 2012, a bilingual version (Chinese and English) of *The Charm of Bamboo: 100 Selected Ancient Chinese Poems on Bamboo* made its debut appearance in the Great

Hall of the People in Beijing. Mr. Jiang Zemin, former president of the People's Republic of China, wrote a preface for it. It also contains the first public appearance of *Bamboo in My Garden*, a poem by Jiang Zemin (President of China 1993-2003). This eight-line poem has seven characters to a line, and is written in Jiang's own calligraphy.

To complete this master work, Professor Peng spent four years gathering and consulting materials and literature; 10,000-year-old stone implements and bamboo tools, symbols on pottery, oracle bones, ancient hieroglyphs, stone carvings and bamboo slips were among the artefacts studied. "The completion of this book does not mean we can write better than anyone else," he said humbly. "But I dare say such a book could never be written in any other country. This book draws its strength from the long history and profound culture of the Chinese nation. Against the vastness of history, the effort of an individual is insignificant."

A Dream to Make the Charm of Bamboo Eternal

Chinese people say that China's bamboos top the world. It should not be understood from a single perspective. Rather, it should be understood through an integrated view of the long Chinese bamboo culture and China's rapidly growing bamboo industry. Seen in this light, bamboo culture, bamboo industry and bamboo civilization are inevitably bound up in their development.

The development of science gave birth to the cultural diversity of the times, and Professor Peng found himself at both ends of the chain of science and culture. He led his team in pioneering genome sequencing of Moso bamboo and mapped its draft genome, thus laying a foundation for the development of bamboo science and technology and bamboo industry. He studied bamboo culture wholeheartedly, producing an in-depth interpretation of the cultural spirit, drawing on and transmitting the traditional and modern cultural heritage of bamboo.

Bamboo civilization is the carrier that most closely blends ancient civilization with modern, and it is this fusing that has forged and sustained the dream of generation after generation, like Professor Peng's, to keep the torch of Chinese bamboo civilization eternally aflame.

Professor Peng Zhenhua has passed away, which makes reading *The Charm of Bamboo* a melancholy-tinged experience. Yet, his dream is still alive, and we believe that the best way to honor his memory is to transmit and spread the bamboo culture.

Years' Commitment to Bamboo Cultivation

Professor Fu Maoyi, chief scientist of the Chinese Academy of Forestry, council member of the Chinese Society of Forestry, and vice chairman and secretary-general of the Chinese Society of Forestry's Bamboo Division



Fu Maoyi, chief scientist of the Chinese Academy of Forestry, once said: "I've spent half a century researching bamboo, and it's been an inexhaustible source of pleasure, a life well spent."

Fu has reaped a bumper harvest from his 50 years dedicated to the bamboo industry. He pioneered research into nutrient cycling in China's bamboo forestry ecosystem and received an award for National Outstanding Contributions from Young and Middle-Aged Experts, and receives government subsidies. He has presided over a total of 15 key research projects internationally and at state and provincial levels. On top of this he has received second and third prizes of the national Science and Technology Progress Awards and second and third prizes of the Science and Technology Progress Awards from the former Ministry of Forestry, five in total. Some of his achievements have pioneered international research.

Fu's "Three Firsts" as a Bamboo Businessman and an Eco-Researcher

Fu is a researcher of vision, courage and action. It is a combination that helped achieve his "three firsts" in bamboo business and ecological research.

His findings provided theoretical foundations and effective technical measures for the scientific management of bamboo forests, rational use of fertilizers, fast-growth and high-yields, results that filled in blanks in the study of nutrient cycling in China's bamboo forest ecosystem. Furthermore, both his scientific achievements and experiments have reached advanced international level. They have been applied to the roughly 1.1 million *mu* (72,000 hectares) of bamboo in four major bamboo-growing provinces. The economic benefits are a net production value of RMB410 million and a foreign exchange earning of USD21 million.

This project was the first long-term, multi-site comprehensive study to probe

systematically into change patterns of the major factors influencing bamboo forest nutrient cycling and the correlation to management measures. In addition, it released a preliminary estimate of nutrient balance in bamboo forests based on soil nutrient studies. Sequence statistics and jackknife resampling techniques were applied to study bamboo forest biomass and it was determined, by means of C.V., the best-sized area that was suitable for the experiment. Furthermore, studies were made on multi-site bamboo development and multi-factor intensive management techniques based on the same experiment, an approach that reduced trial costs by between a third to a half. Explorations were made into the possibility of using gray box model to calculate input quantities of certain nutrients, starting with the economic analysis of fertilization of bamboo forests grown for different purposes.

In addition, he and his team were the first to conduct researches on the structure of Moso bamboo forests with the potential for high pulp yields, notably on the high-yield model of short-rotation Moso bamboo pulp forests. The ultimate purpose was to achieve annual yields of 32.53 ton per hectare of bamboo timber from the forests grown under this model. This achievement was a pioneering move in directional intensive cultivation of Moso bamboo pulp forests in China, taking the overall level to leading international levels. This model was applied to an area of 43,000 hectares, lifting values by RMB250 million.

Fu's third "first" was his contrastive analyses of markets, economies and policies between major bamboo-growing areas with disparate economic development levels in experimental units he set up along the South China Sea littoral (Anjie in Zhejiang) and the south-western interior (Pingjiang in Hunan and Muchuan in Sichuan). He was also the first to propose a systematic approach to production and consumption of bamboo products, and delved into the structure of bamboo products, mechanisms of production and circulation influencing the development of bamboo industry in the areas under investigation. Subsequently, he proposed measures concerning business management, policies, financial support, scientific and technological systems, and the development of ecological economy and bamboo industry restructuring. His suggestions were all adopted by the local governments.

Laying the Cornerstone for Bamboo Cultivation and Agro-forestry

In the 1970s, Fu was transferred from the production frontline to the Chinese Academy of Forestry, progressing from project leader, to deputy director and director of the academy. He shouldered a great many responsibilities on top of research activities.

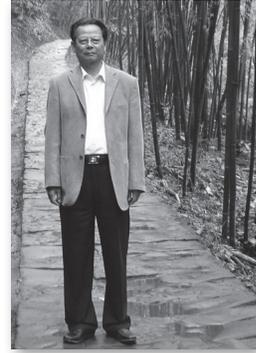
Fu was alive to the importance of nurturing a research team in science and technology, and building scientific systems of bamboo forest cultivation and agro-forestry in order to ensure constant sci-tech advances in his discipline. Therefore, thinking strategically, he began to shift part of his attention to graduate education.

Graduate numbers from the academy topped others in the field, and a brilliant academic cohort of multi-disciplinary collaboration was formed. This has become a special strength of the Subtropical Forestry Research Institute of the Chinese Academy of Forestry.

In 1992, Fu became a master degree supervisor, and a doctoral supervisor in 1998. To date he has supervised four graduate students and eight doctoral students and has guided two post-doctoral scholars. Among the eight published books either written or compiled by Fu are *A Compendium of Chinese Bamboo, Cultivation and Utilization of Bamboo*, *Proceedings of Symposium on Social Economy, Markets and Policies of China Bamboo Industry*; as well as over 70 papers published in China and abroad.

Fu frequently exchanges ideas with foreign scholars on his bamboo research and has been overseas as a visiting scholar or lecturer on many occasions. He has been invited to lead several international bamboo training courses in China, spreading to the rest of the world advanced Chinese bamboo-related theories, technologies and management experience.

Pursuing the Dream: Making Bamboo a Perpetual Source of Wealth



Professor Xiao Jianghua, chief scientist of the Chinese Academy of Forestry

These days, China's bamboo industry occupies an unshakable position of dominance in the world. However, 30 years ago, despite having enormous bamboo forests, bamboo production was very low, the quality left much to be desired, and there was not enough of it to satisfy demand.

What brought about the tremendous change in China's bamboo industry in just a few decades? The answers are many and complex, but one thing stands out — the cultivation of bamboo forests.

Xiao Jianghua, senior researcher at the Subtropical Forestry Research Institute of the Chinese Academy of Forestry, has spent more than 40 years studying bamboo forest cultivation. From his experience, we can get a glimpse of the growth story of China's bamboo forest cultivation.

Bamboo Forest Cultivation: a Foundation for Bamboo Industry Development

In the 1980s, more than 80 percent of China's bamboo forest was of low quality, low production and low efficiency.

After the 1980s, China's processing industry rose rapidly, and this rise was paralleled by a similar rise in demand for such bamboo products as bamboo timber and bamboo shoots. This phenomenon accelerated the development of bamboo forest cultivation and management.

Xiao Jianghua, on the basis of low-yield bamboo forest transformation technology, led his team to carry out the research on the high-yield cultivation technology of bamboo forest, and put forward the classified management and targeted cultivation of bamboo forest. They studied the high-quality, high-yielding, high-efficiency and sustainable management of Moso bamboo timber forest, shoot forest, bamboo shoot and timber forest, and pulp forest as well as shoot forest of sympodial bamboos such

as *Dendrocalamus latiflorus* and they were in charge of drafting and making the relevant industrial and national standards. While studying application technologies, they conducted fundamental research from the perspectives of bamboo biology, physiology and ecology, biodiversity studies of bamboo forest, and the theoretical researches of bamboo forest management. All these supported the development of bamboo forest cultivation technologies and the bamboo cultivation subject with theoretical knowledge.

Efficient Management: Transforming Bamboo into a Perpetual Source of Wealth

Bamboo has been cultivated and planted for thousands of years in China. It seemed impossible to make bamboo a perpetual source of wealth. But Xiao Jianghua and his research group did work the miracle.

How to make the enormous low-yield Moso bamboo forest high-yield? Xiao Jianghua and his research group firstly adjusted the bamboo forest structure, so the standing density, diameter levels and age composition of the low-yield bamboo forest rapidly reached the levels of high-yield bamboo forest. Then, they took such measures as weeding and scarification, scientific fertilization, disease and pest control, and protection of the shoots to grow more and bigger bamboos. Through this approach, they improved the standing density of bamboos from 1,050 per hectare to 2,143 per hectare, the average diameter of standing bamboos from 6cm to 8cm, and the number of commercial bamboos from 30 per hectare to 150 per hectare.

Xiao Jianghua and his group aspired to achieve more than these advances. At that time, Moso bamboos were grown mainly for timber rather than for shoots. To solve this problem, they started studies on the management pattern and adjunct skills for Moso bamboo shoot and timber forest.

In 1990, they set up a demonstration forest of 7,000 hectares in Longyou County, Zhejiang Province. In 1993, the average production of bamboo timber reached 22.1 tons per hectare, and that of bamboo shoots 2.32 tons per hectare, and the output value reached RMB106,000. Among them, the average production of bamboo timber from the site class-I bamboo land (about 900 hectares) was up to 26.1 tons per hectare, that of bamboo shoots to about 3.79 tons per hectare and the output value surpassed RMB140,000.

Today, the highly efficient management pattern invented by Xiao Jianghua and his group, which is regarded as the model, has been promoted in bamboo production areas throughout China, and has become the major management pattern of high-quality Moso bamboo forest.

The Ultimate Goal: to Enrich Bamboo Farmers and Beautify the Environment

Enriching bamboo farmers is the long-cherished wish of Xiao Jianghua.

It was not easy to get farmers who have cultivated bamboos for countless generations to accept the new cultivation model. How to successfully introduce the highly efficient management pattern to them?

In those years, Xiao Jianghua, over 60 years old at the time, tirelessly kept taking his research group into the bamboo heartland in order to promote their efficient bamboo forest cultivation mode. They taught the growers new technologies and new ideas of bamboo forest management in the fields, in the villages, and even in their homes. Considering the farmers' low level of education, they took care to compile popular scientific materials that could be easily understood. In addition, via more than 10 projects of which Xiao led, including the Rural Industrial Technology (Spark) Program and key provincial and ministerial projects, in China's major bamboo-producing provinces, Xiao set up demonstration bamboo forests for improving low-yield bamboo forest and cultivating high-yield bamboo forest.

In four years' time since they set up the demonstration forest in Longyou, net bamboo forest income increased four-fold, from RMB1,632 per hectare to RMB6,814 per hectare. Thanks to the shoot and timber bamboo forest, the income of more than 9,000 farmer households who participated in the demonstration forest experiment increased by RMB3,954 per household in four years. Quite a few "10,000-yuan households" (with an annual income of or above RMB10,000) and "million-yuan villages" (with an annual collective income of or above RMB1 million) appeared, which was something really remarkable in China's rural areas in the 1990s. One senior village official saw the cultivation of bamboo as important as that of rice, and said, "Through the promotion and application of hybrid rice, we solved the problem of food shortage and we have enough food; through the technological promotion of shoot and timber bamboo forest of Moso bamboo, we solved the problem of poverty and have enough money."

Making Bamboo Enterprises More Competitive by Promoting Industry Standards



Professor Fei Benhua, executive deputy director general of ICBR,
and chief expert of the Research Institute for Bamboo and Rattan, ICBR

On April 26, 2016, the Bamboo and Rattan Technical Committee of the International Standardization Organization (ISO/TC296) was established in China, the “Kingdom of Bamboo.” This is the first international forestry standardization organization to be based in China; in addition to accelerating China’s engagement in world economic governance, it is also a new push for China as a participant and builder of the international economic order. Dr. Fei Benhua, chairman of ISO/TC296 and executive deputy director general of ICBR, is very confident about China’s role in the bamboo industry of the future.

International Bamboo and Rattan Manufacturing in Urgent Need of Standards

China has abundant bamboo resources and its bamboo products account for a big share of international markets. The new bamboo business involves growing bamboo, bamboo processing, product exports and bamboo eco-tourism. There are over 10 million people directly engaged in the bamboo industrial chain. According to State Forestry Administration statistics, China’s revenues from bamboo soared to RMB184.5 billion in 2014 as against RMB82.1 billion in 2010. They account for over one-third of local financial incomes of cities and counties with a well-developed bamboo industry.

Bamboo and rattan are chiefly grown in developing countries in Asia, Africa and Latin America. Due to technical trade barriers, 70-odd bamboo product producing countries feel the restrictive effects of major consumer countries and regions such as the EU, the USA, Canada and Japan, preventing them from fully playing their roles in ecological conservation, betterment of environment, poverty elimination and resource substitution.

In Fei’s opinion, a more far-reaching impediment to China’s development of

its bamboo industry is the lack of international bamboo and rattan production standards. He is sure that setting unified international standards regarding grades of bamboo and bamboo products can guide farmers in bamboo cultivation and production and businesses in processing and marketing products and semi-products, so that bamboo production can represent a greater proportion in economic development. Furthermore, it may help avoid difficulties and confusion in foreign trade from the lack of a common language.

But that is only part of the story. Implementing international bamboo and rattan standards in a major forestry country like China will play a vital role in expanding forestry acreage, adjusting the proportions of types of bamboo, and in improving forest quality. In addition, it may bring about new breakthroughs in carbon trade and coordinate the industrial chain of bamboo production, supply and marketing.

China's Endeavors to Set International Bamboo and Rattan Production Standards

Jiang Zehui, chairman of the National Bamboo and Rattan Standardization Technical Committee and director of the ICBR, points out that setting international bamboo and rattan production standards, based on China's successful domestic experience and achieving international endorsement, will promote the healthy development of the industries and create optimum order in international bamboo and rattan trade.

In early 2014, the ICBR proposed the formation of the ISO Bamboo and Rattan Technical Committee. Subsequently, the State Forestry Administration, Standardization Administration of China, and International Network for Bamboo and Rattan jointly formed a preparatory team for setting up the Bamboo and Rattan Technical Committee and drew up work plans. Experts were brought in time after time to assess the team's proposals and its documentation regarding the founding of the Bamboo and Rattan Technical Committee. The proposal underwent several revisions.

On March 10, 2015, the ISO Secretary-General Rob Steele was invited on a fact-finding visit to the ICBR. He spoke highly of China's efforts to establish the ISO/TC 296 and offered insights on its work. On May 28, the ISO Technical Management Board passed a resolution approving the proposal.

"It was the result we were looking for," Fei says.

Standardization Propels High-tech Transformation into Productive Force

The ICBR is China's national-level comprehensive institute of bamboo and rattan science and technology. It has laid the foundation for research into bamboo and rattan cultivation, processing and industrialization, facilitating studies on the standardization of bamboo and rattan products, and the formulation and revision

of standards. Over the last decade, the center has made and revised over 30 sets of national and vocational standards regarding bamboo and rattan production. The center is currently involved in drawing up standards for international Common Fund for Commodities (CFC) projects in terms of semi-processed bamboo products, woven mat ply-bamboo and bamboo laminated timber.

Currently, China is the world's second largest economy, and is the global leader in terms of the output value of the manufacturing industry. Its bamboo industry is among the vital forces of "Made in China" products.

"But greater output quantity is no indicator of industrial superiority and the reason lies in standardization." In Fei's opinion, building up a standards-led industry is a key step towards producing quality "Made in China" goods in greater numbers. That is why the establishment of the Bamboo and Rattan Technical Committee in China will surely be a great impetus to the upgrading of its bamboo and rattan industry.

International Standardization of Bamboo Products Calls for Multi-National Cooperation

Fei says that China should build on her experience won in implementing national standards and strive to lift them to an international level.

According to Fei, the new technical committee will engage in the standardization of bamboo, rattan and their derivative materials and products. It will include making standards in respect to technical language, classification, regulation, testing methods and quality requirements. It will exchange views with producer and consumer countries. In addition, it will talk with the various technical committees of the ISO, International Bamboo and Rattan Organisation, international tropical timber organizations and relevant domestic research institutes and manufacturers. After wide-scale discussions, they will formulate international standards for bamboo and rattan products.

The Bamboo Technical Committee will standardize as soon as possible the physical, mechanical and chemical methods for testing bamboo. This will help compare the properties of different bamboos and rattans in different countries and regions and will be of great importance to their scientific and effective exploitation and research into them. At the same time, and with a view to facilitating international trade, the committee will also direct some of its attention to large bamboo and rattan products like bamboo plywood, bamboo charcoal, bamboo and rattan furniture, and draw up standards for special products such as woven bamboo and rattan products, bamboo cutting boards and bamboo bowls.

In Fei's words, "there's a long way to go towards international bamboo and rattan standardization, but the prospect is bright."

Academicians Help Double the Bamboo Utilization Rate

Professor Wu Yiqiang, academician of the International Academy of Wood Science and vice president of the Central South University of Forestry and Technology



Wu Yiqiang is an academician of the International Academy of Wood Science and vice president of the Central South University of Forestry and Technology. Through persistent exploration and assiduous study, he has made great contributions to raising the utilization rate of bamboo.

Never Forgetting the Original Intention

Wu Yiqiang's resolve to study bamboo goes back to something he once happened to see. "At the school gate I saw fellow-villagers driving convoys of bamboo-laden tractors to our school's 'bamboo plywood factory.' To see load after load of bamboo go in and load after load of bamboo plywood emerge struck me as really interesting." On later enquiry he learned that the application of Professor Zhao Renjie's new hot pressing technology involving bamboo mat and curtain plywood was playing a huge part in enriching local farmers. "I realized that scientific research could benefit and serve the people in every aspect of life. It was this that set me on the path of research into wood and bamboo materials."

Wu Yiqiang started laboratory study of bamboo and wood science and deep processing technology during his undergraduate years. When doing his master's degree, as his basic specialist knowledge grew, he began exploring the correlation in different bamboo materials between their structures and their properties. Over the years, Wu Yiqiang has devoted himself wholeheartedly to scientific research into bamboo and wood materials, focusing on the improvement of bamboo and wood function, bamboo-plastic composites, engineered bamboo, etc.

Initial Success — a Breakthrough in Flame-Retardant Technology

Opportunity favors the prepared mind. In 2002, Wu Yiqiang was offered a full scholarship by the Japanese Ministry of Education, Culture, Sports, Science and

Technology (MEXT) and went to Japan to study. A problem with fast-growing woods in widespread use is that they come under great stress in the drying process, with obvious deformation; in order to tackle this problem, Wu Yiqiang proposed “collapse-shrinkage of wood cells and maximum collapse-shrinkage theory,” which provided theoretical guidance for rapid, high-quality drying of wood materials such as eucalyptus and poplar.

After returning to China in 2005, Wu Yiqiang applied for projects and received funding from the National Natural Science Foundation of China and the Scientific Research Foundation for Returned Overseas Chinese Scholars under the Chinese Ministry of Education. Then Wu Yiqiang and his team quickly focused on timber flame-retardant technology. They screened over 10,000 different kinds of flame-retardant and smoke-suppressant compounds, made thousands of experiments, searched hundreds of enterprises, and consulted numerous front-line production technicians and experts. Finally, in 2009, having overcome successive technical challenges, they successfully introduced inorganic flame retardant into wood-based composites, thus achieving the effective combination of dissimilar materials. This was awarded a second-level National Prize for Science and Technology Progress in 2010.

Building on this inorganic flame-retardant technology, they formulated a manufacturing technology system for use in straw composites only and developed a range of straw-based composites with wide market prospects. The research outcomes have been applied in a dozen enterprises and have won one provincial first prize and two provincial second prizes for scientific and technological progress.

Blossoming of New Utilization Technology

In 2011, facing bottleneck problems in the development of bamboo-based composites such as high environmental pollution and low bamboo utilization rate, Hunan’s Provincial Department of Science and Technology launched a major special project “Research and Demonstration on Key Technology of Bamboo Deep-Processing.” Professor Wu Yiqiang was put in charge. Through industry-university-research collaboration and combining research amassed over more than a decade, his team developed a series of new materials and equipment. The former included decay-resistant strand woven bamboo for outdoor use, high-strength weather-resistant bamboo decoration material for outdoor use, water-resistant heavy-load bamboo-wood composite as engineered material, and bamboo fiber for textiles. The project has generated more than 20 national patents, and multiple production demonstration lines have been built, such as for environment-friendly and mildew-proof chopping boards using strand woven bamboo, and decay-resistant strand woven bamboo for outdoor use. When the project was implemented, new output value increased by RMB814 million and new profits and taxes increased by RMB119 million. In addition, Hunan Taohuajiang Bamboo Technology Co., Ltd. was successfully floated.

With the application of the special technology, over 90 percent of raw bamboo can be utilized in weather-resistant strand woven bamboo for outdoor use, doubling the added value.

But Wu Yiqiang is modest about these achievements, commenting, “In provinces like Zhejiang and Fujian where bamboo processing is highly developed the bamboo utilization rate is already above 90 percent. We cannot rest on our laurels.”

Learning from Experience, Creating a New Future

Professor Wu Yiqiang’s gratifying achievements owe much to his perseverance in combining basic theoretical innovation with advanced technology R&D, and to the importance given to promoting innovation through industry-university-research-application collaboration. He observed: “I learned from Professor Zhao Renjie that scientific research should serve production and contribute to the development of industry. And we researchers are inspired to be energetic in exploring continuous innovation by the spirit of Academician Li Jian’s pursuit of international leadership in wood science and technology.”

Looking to the future direction of research, Wu Yiqiang said, “At present China’s bamboo industry has the problems of low mechanization, low added value of products and a serious imbalance between the condition of resources and industrial scale. My future research will focus chiefly on the transformation from labor intensiveness to mechanized and smart processing, from traditional bamboo products to products with high added value, and the development of new products for extensive use in areas such as building structures and furniture and decor.”

A Leader in Bamboo Carbon Sink Research

Professor Zhou Guomo, president of Zhejiang Agriculture and Forestry University



Sixteen years ago, Professor Zhou Guomo, president of Zhejiang Agriculture and Forestry University, made a surprising research discovery, namely the strong carbon sequestration capacity of bamboo. It was the start of a long journey into the deep study of bamboo carbon sinks. Taking prevalent bamboo species in southern China as his starting point, he intensively studied the dynamics, patterns and distributions of bamboo carbon sinks, researched the impact of human disturbance and operation on the carbon sink capacity of bamboo forest, and achieved plenty of gratifying results.

Bamboo Forests Helping Mitigate Climate Change

Zhou Guomo was one of the earliest experts in China to systematically research bamboo carbon sinks. He considers China to have the world's largest bamboo growing area, the greatest production and output value, and the best processing and utilization of bamboo. Therefore, it is of great practical significance to conduct research into bamboo carbon sinks, to get the world to accept them.

Over the past 16 years, Zhou Guomo, aiming to promote bamboo carbon sink research and serve forest carbon sink trading, has presided over a dozen projects. He concentrated on the carbon sequestration process, carbon monitoring and carbon sink capacity enhancement of the bamboo forest eco-system. He has solved three key questions: how to sequester carbon via the bamboo eco-system, how to monitor and measure carbon, and how to enhance carbon sequestration.

Under his leadership, the group has focused on forest carbon sinks and how to respond to global climate change. He actively promotes technologies for increasing forest carbon sink capacity and those for reducing carbon emission, and guides how the forest carbon sink project is conducted. He has made important innovations and breakthroughs in research on bamboo carbon sinks and in forest carbon

sequestration methodology. His research group has published some 200 papers on bamboo carbon sinks. The outcomes of two important research projects that he led won first prizes in the Zhejiang Province Science and Technology Awards.

Since 2002, working with the International Network for Bamboo and Rattan (INBAR) and China Green Carbon Fund, Professor Zhou's research group has carried out a series of projects, including the world's first Moso bamboo carbon sink project. In the course of their monitoring and measurement they produced data and standards for the building, carbon monitoring and carbon measurement of Moso bamboo carbon sinks. They also formulated a methodology for bamboo carbon sink management and spread the research results to the whole society, in the hope that the power of bamboo can help deal with climate change.

With the co-organization and support of INBAR, China Green Carbon Fund and Zhejiang Agriculture and Forestry University, Zhou Guomo oversaw the development of Methodology of Bamboo Forest Carbon Sink Building Project, Methodology of Bamboo Forest Carbon Sink Management Project, Methodology of Monitoring and Measuring Bamboo Forest Carbon Sequestration, and Methodology of Bamboo Carbon-Sink Forest Management. These marked the inclusion of bamboo forest carbon sinks in domestic and international carbon trading.

Bamboo Carbon Sinks Benefitting Society

In spreading the research results of Methodology of Bamboo Forest Carbon Sink Building Project, Zhou Guomo tried to use simple words and expressions, lest technological terms and expressions baffle local farmers. Aware of the fact that these single-household projects are small-scaled, of various types and urgently needed, he and his group drew up Temporary Management Measures for Lin'an Farmers' Forest Carbon Sink Project and compiled Guide for Lin'an Farmers' Management and Monitoring of Forest Carbon Sinks to assist the farmers' understanding, retention and practice.

Through the joints efforts of Zhou Guomo and his group, a trading system of farmers' forest carbon sinks came into being, a standardized system that is strictly regulated and easily operated. It started a new model whereby forest ecological services are given value and monetized by purchasing farmers' forest carbon sinks.

In recent years, Zhou Guomo's research group has set up various types of carbon sink afforestation demonstration zones, covering 40,000 *mu* (2,670 ha) in Zhejiang Province and nearby areas, and promoted more than 300,000 *mu* (20,000 ha) of carbon sink management demonstration zones. These have significantly improved the level of forest management and carbon sequestration effect. The demonstration zones alone can achieve annual carbon reductions of around 122,000 tons and have generated significant ecological, economic and social benefits.

Thanks to his efforts, Lin'an City and Anji County become the first experimental

carbon sink forest region in China and the world's first ever bamboo forest carbon sink demonstration region, and carbon sink trading was realized. In addition, he established China's first Moso bamboo forest carbon sink project in Lin'an City, Zhejiang Province.

So that carbon sink research outcomes may better serve social development, Zhou Guomo, as the "low carbon consultant" for many cities, delivers reports to many municipal and county leaders and briefs them on the research development of bamboo carbon sinks, the mechanisms by which carbon sinks reduce emissions, and future measures for dealing with climate change, thereby helping the low carbon concept take root and grow in strength.

Since 2009, Zhou Guomo has attended United Nations Climate Change Conferences, subsequently proposing six technical reports recommending the use of bamboo in dealing with climate change. These reports have done much to move the international community to integrate bamboo into forest carbon sinks, to start and promote the development of bamboo carbon sink industry in China, and to increase the proactivity of Chinese forestry in the discourse on climate change.

Looking back on a decade of bamboo carbon sink research, Zhou Guomo said with deep feeling, "I want to be a bamboo with luxuriant foliage, mature and tough. On the one hand, it grows and develops itself; on the other hand, it transports the nutrition it has stored to the new bamboos. I want to help young people grow and develop rapidly like bamboo shoots after the spring rains."

Tech Breakthroughs Cause Bamboo Products to Soar in Value



Professor Yu Wenji, director of the Research Center of Engineered Bamboo Materials, Chinese Academy of Forestry

Bamboo-based products have become more and more popular with consumers because of their smooth and glossy quality, bright and fresh color and classic style. However, in the industrial process to make products such as bamboo floors, it used to be necessary to remove the outer (green) and the inner (yellow) skin of the bamboo, since the smooth skin and waxy layer affect gluing.

Yu Wenji, the director of the Research Center of Engineered Bamboo Materials, Chinese Academy of Forestry, and his research group are seeking technical innovation. Utilizing to good effect the technology of high-performance bamboo-based fiber composite materials that they had developed, they broke a key technical bottleneck in the development of the bamboo industry. The problem was that bamboo complete with outer and inner skin cannot be glued, resulting in the low utilization ratio of bamboo materials, low processing efficiency and inefficient utilization of small-diameter bamboos. As a result of their efforts, the utilization rate rose from 50 percent to 90 percent and above.

In 2015, the “Manufacturing Technology and Industrialization of the High-performing Bamboo-based Fiber Composite Materials” won the second national scientific and technological progress prize.

Bamboo: Love at First Sight

In 1986, Yu Wenji was admitted to Beijing Forestry University and began his postgraduate study under the supervision of Professor Zhao Li, famous for his work on wood-based panel, and participated in his supervisor’s project the “Manufacturing Technology of Bamboo Plywood Cement Mould.” In the second year, Yu went to Changsha to carry out targeted research on the project. Behind Yuelu Academy in Changsha, the large areas of bamboo forest, green and luxuriant, attracted him deeply. Ever since that time, his life and studies have been closely connected to

bamboo. His MSC thesis was “A Study on the Technology of Bamboo Plywood Surface Decoration,” in which he proposed the preliminary technology for bamboo curtain board.

After achieving his Master’s degree, Yu Wenji was assigned to work in the Chinese Academy of Forestry. In 1998, under the supervision of Professor Jiang Zehui, he began to study the physical and mechanical property variations of bamboo, and participated in the research work of bamboo materials of 973 Plan, a state-level program to boost research in basic science presided over by Professor Jiang Zehui.

In 2004, Yu went to study in the USDA Forest Service Southern Research Station. There, under the guidance of the chief scientist Mr. Xu Zhongyun, he collaborated with others in research on bamboo and wood scrimber.

Innovative Technology Sends Product Value Soaring

Since 1986, when Yu first came into contact with bamboo plywood manufacturing technology, he and his team have produced a string of innovation outcomes. The technology of efficient utilization of high-performance bamboo-based fiber composite materials that they developed has caused the value of bamboo products to soar, and they have made great contributions to bamboo industry development and eco-environment protection.

Yu Wenji said: “In the past, in China the outer and inner skin of bamboo had to be removed in processing bamboo boards; otherwise it couldn’t be effectively glued. This set me wonder how we could improve the bamboo utilization rate and substantially increase the production efficiency without removing the outer and inner skin.”

From 2005, Yu Wenji led his team to carry out key researches in the areas of technology and equipment. For the core defibering equipment alone, they produced four generations of product. Finally, in 2009, they developed core equipment capable of industrialization and, in Hongya County, Sichuan Province, built the first demonstration production line of bamboo fiber composite materials where they trial-produced the first batch of materials for the manufacture of wind turbine blade materials. During the next few years, the technology was rapidly promoted and disseminated, promoting the development of the industry and greatly improving production efficiency and product quality.

At the same time, through innovation, they established high-performance, multi-purpose bamboo-based fiber composite platform technology, and developed more than 10 series of functional products, including materials for wind power use, outdoor applications and furniture. Their innovative technology has improved the first-time utilization rate of bamboo from 50 percent to over 90 percent, increased the highest selling price of wind power products and outdoor products to RMB15,000 per cubic meter, to triple that of cement moulds, and made it possible

for bamboo materials to enter the high-end manufacturing field. In so doing he has laid a solid foundation for the bamboo industry to keep on with industrial upgrading and automation.

No Pains No Gains

At the initial stage of the project research, funds were sorely lacking, so Yu Wenji and his group organized to cooperate with some enterprises and found a new way to combine scientific research with manufacturing processes.

Yu Wenji's group had to conduct experimental research, commission equipment, and make pilot plant and run production tests, but their work did not end there: they had to push for the final promotion of their sci-tech results. The pressure was huge, but Yu Wenji said, "Our group is an elite squad, one that can fight hard. It's rated as one of the top five groups of the Chinese Academy of Science."

Good technical results need good technical services and popularization. In the process of applying and promoting the technologies, Yu Wenji and his group stuck close to the production front line to make production trials and provide technical guidance. They identified the technological difficulties in production, made them into topics for research, and solved them by including them in the national scientific and technological projects. They often gave lessons to front-line workers, so that the sci-tech outcomes would be translated into good products.

Dedicated to Improving People's Wellbeing Through Bamboo



Professor Yang Yuming, former president of
Yunnan Academy of Forestry

“During the past half century, two generations of scholars here have overcome countless difficulties; they believe that you are not a good scholar if you do not serve the motherland and if you cannot improve people’s wellbeing through bamboo, you have not done your job.” This is the prefatory remark in *Fifty Years in Yunnan’s Bamboo*, and in a sense, it encapsulates the life and quest of Professor Yang Yuming, former president of Yunnan Academy of Forestry.

Dedicated to Bamboo Research for 30 Years

Yang Yuming has been dedicated to bamboo studies for 30 years. He has left deep footprints on the path of bamboo research in Yunnan.

The Bamboo Garden at the World Horti-Expo in Kunming, Yunnan Province introduced 376 kinds of bamboo from around the world. To date, it has the widest range and largest number of bamboo species in the world and is the biggest bamboo species conservation garden with the most complete life forms and ecotypes of bamboo, winning it entry into *Guinness World Records*. It was built by a group headed by Yang Yuming.

In researching bamboo resources, Yang discovered a number of new bamboo taxa. In Longling County, Baoshan City in the west of Yunnan, he found the world’s first bamboo fossil, which proved that Yunnan was a major place of bamboo plant origin in the world. He initiated research on the geographical distribution of Yunnan’s bamboo plants and completed “The Geographical Regionalization of Bamboo in Yunnan.”

In the research project “Methodologies for Large Natural Bamboo Forest Surveying” headed by Yang Yuming, a quantification theory was introduced for the first time in China into the survey planning for natural bamboo forest resources and the evaluation of bamboo volume and site quality. He led his group to develop

theories and technologies for the intensive management and high-yield and targeted cultivation of sympodial bamboos; they put forward rattan cultivation technologies, and built more than 10 bamboo and rattan development bases. In addition, they made big leaps in rapid propagation technology, and in anti-moth, anti-decay and anti-mildew technologies.

On this basis, he cooperated with his supervisor, Professor Xue Jiru, in writing the first monograph on bamboos of Yunnan Province, which was called *Bamboo Resources in Yunnan and Their Exploitation*. He and his group compiled *The Cultivation and Utilization of Bamboos*, which was the first textbook about bamboos used in the forestry colleges and universities in China. They published many other books on bamboo research, such as *The Industrial Utilization Study of Large Sympodial Bamboos*, *Industrialized Development and Utilization of Shoot Bamboo Forest*, *The Handbook of Bamboo Cultivation and Utilization in China*, *The Bamboos in Nujiang Area*, *Illustrated Bamboo Annals in Honghe Area*, and *Illustrated Bamboo Annals in Yunnan*. *China's Bamboo*, co-authored by Yang Yuming and Hui Chaomao in English, has been translated into Portuguese and Spanish, and it provides reference and guidance to the cultivation and utilization of sympodial bamboos in the tropical bamboo areas in Central and South America and Africa.

Hard Field Work and Pioneering Research

Since 1985, Yang Yuming and other researchers systematically surveyed resources in some important bamboo areas. For the first time, they revealed the rich bamboo resources in the areas such as the Nujiang River and Dulongjiang River basins, snow-capped Biluo Mountains, and Gaoligong Mountains. They discovered 18 new bamboo species, among which the red-flowered *Cephalostachyum scandens* and the epiphytic *Gaoligongshania megalothyrsa* are very rarely seen in the whole world.

In 1992, they conducted another study of bamboo resources in the Gaoligong Mountains area and Dulongjiang region and found 13 new bamboo species and one new bamboo genus. The most precious outcome was the collection of a flower specimen of the epiphytic *Gaoligongshania megalothyrsa*, the world's only known epiphytic bamboo.

Yang Yuming and his group conducted the first experimental studies on vegetative propagation technologies of bamboo stumps, culms, branches, buds and shoots. They successfully developed a set of technologies for the artificial rapid asexual reproduction of large sympodial bamboos. For the first time, they put forward clumping scale and culm number as the two density indexes of the sympodial bamboos and the concept of culm age structure, and proposed theories and methods of sympodial bamboos management and cultivation. For the first time, Yang and his group introduced from New Zealand technologies to control plant pigment genes and successfully cloned two regulatory genes of bamboo anthocyanins. Two major

regulatory genes controlling anthocyanin biosynthesis were found in bamboo plants for the first time, which won them a new function gene registration number in the gene bank of the US National Center for Biotechnology Information. In addition, employing this technology, they succeeded in cultivating two new red culm species.

Leading the Bamboo Industry to Shoulder Social Responsibilities

Yang Yuming has led dozens of projects relating to bamboo and rattan research and development, built 11 bamboo and rattan development bases, and promoted the establishment of a high-yield cultivation base of 1.2 million *mu* (80,000 ha). He made great efforts to promote bamboo-made biogas digesters, which provided strong support for rural development.

With Yang Yuming and others promoting and spreading the message, at least 30 counties in Yunnan have included bamboo as an important part of their plans for the development of forestry and mountain areas.

In 2010, Yang Yuming put forward the idea that the world's largest bamboo and rattan germplasm garden could be built in the subtropical mountain areas of southern and central Yunnan. He made good use of the favorable geographical conditions in Pu'er which lies south of the Tropic of Cancer and registered the company "Pu'er Asian Bamboo and Rattan Expo Investment and Development Co., Ltd." So far, this company has introduced more than 500 species of bamboo and 30 species of rattan from all over the world.

A Persistent Explorer of Bamboo and Rattan Classification



Professor Wang Kanglin, director at the Green Resources Research Center, Southwest Green Development Research Institute of Southwest Forestry University

In 2013, at the first conference of the Bamboo and Rattan Resources and Utilization Branch of Chinese Society of Forestry, every attendee was given a copy of *Rattan in China*. Wang Kanglin was a chief editor of this richly detailed, well-evidenced, systematic and concise reference work, a fact that gave very many delegates a favorable impression.

Traditional Bamboo Classification by Minority Peoples

Professor Wang's remarkable achievements in his research on bamboo classification owe much to his exploration of traditional bamboo classification by China's ethnic minority groups. Folk identification, naming and classification of plants are based on folk practice, folk customs, folk legends and cultural beliefs combined with economic value, usable features, exterior forms and growth patterns. Such identification is intuitive, practicable and infallible. For Professor Wang it was an important clue. He describes as unforgettable the pleasure and rewards derived from his investigations in ethnic minority villages.

Once at sunset, Wang visited a Hani bamboo house and talked to a man in his 70s, who was very knowledgeable on the subject of bamboo. Wang got to know that "A" means a straight bamboo, "zhu" smooth, "qie" sweet (bamboo shoot), "ha" bitter, and "Ha" climbing (bamboo). When hearing that "nong" means thorny, Wang got excited and asked whether the thorns grow on branches or stems and whether the bamboos grow in clusters or scattered. When informed that the thorns are on stems and the bamboos grow in clusters rather than scattered, he decided immediately to go looking for them in the mountains the following day.

After an excited and restless night, Wang went with the old man looking for the Anong bamboo; they walked for over 20 km in the mountains before finding it. Seeing *Chimonocalamus* right there in front of him, his fatigue vanished immediately.

Thus, Wang became the first scholar to discover the genus in Xishuangbanna Autonomous Prefecture.

On his way back, all he could talk about was classification of bamboos. After ceaseless seeking, identifying and consulting and systematic sorting out, Wang completed an important paper entitled “Folk Classification and Conservation of Bamboo in Xishuangbanna, Yunnan, Southwest China,” which was published in the top international ethno-biological *Journal of Ethnobiology*.

30 Years Devoted to Classifying Bamboo and Rattan Resources

In early 1986, Wang chose as the title for his undergraduate graduation thesis “An Investigatory Study of Bamboo Classification in Luchun County of Yunnan Province.” He consulted two eminent bamboo and forestry experts, Professor Xue Jiru and Professor Zhang Weiping, and spent two months conducting field research, investigating and identifying sample bamboos and organizing the relevant information. His completed thesis, which was rated outstanding, set him on his future path of bamboo classification research.

After graduation, Wang went to work in the Yunnan Institute of Tropical Plants of the Chinese Academy of Sciences (present-day Xishuangbanna Botanic Garden). A year later, he was transferred to Kunming Institute of Plants and worked under the supervision of renowned rattan scientists and research fellows, Chen Sanyang and Pei Shengji. They collaborated on and completed a National Science Fund project “Research on Ethnobotany of Bamboo and Rattan Resources in Xishuangbanna.” It won a 1987-1989 Yunnan Natural Science Award.

In 1995, Wang Kanglin won a Ford Foundation scholarship and went to study for a Master’s degree at the University of the Philippines. In 1997, he was awarded a fellowship by the Worldwide Fund for Nature-USA. Supervised by Dr. Garcia and other four doctoral supervisors, he completed his Ph.D. thesis.

By the end of 2016, Professor Wang had published more than 60 research papers and eight monographs, and co-compiled books and co-edited collections of papers, 24 altogether. Since starting his investigation into bamboo resources in 1986, he has spent over 30 years doggedly exploring the classification of bamboo and rattan resources.

Forging Ahead with a Strong Faith in the Cause

Professor Wang believes that for a researcher to achieve good results, four things are necessary; guidance from the supervisor, one’s own persistent efforts, the support of friends and a favorable working environment.

Wang Kanglin says his passion for bamboo classification developed in Professor Xue’s classes and under his thesis supervision. In comparison with research on other plants, bamboo and rattan research is way more physically painful. He suffered badly

from mosquito bites in tropical bamboo forests and from bloody cuts inflicted by the stiff thorns of rattan. But without a commitment to scientific research, the pleasure of achieving results will never come. At the same time, he gives much of the credit for his achievements to the good research conditions of the institute, the biodiversity of Yunnan Province and the traditional classification selflessly shared by friends in ethnic minority regions.

In the future, Professor Wang intends to carry on with his bamboo classification and to strengthen his research on rattan classification and development of its uses. His guiding thought is to take pleasure in nature, love bamboo and rattan with a passion, and work hard for the well-being of the people.

Lab Among the Bamboos

Dr. Fan Shaohui, director and chief expert of the Research Institute of Bamboo and Rattan Resources and Environment, ICBR



Dr. Fan Shaohui's field of research is bamboo cultivation. Put simply, his major research objective is to find the best approach to bamboo forest cultivation management, so as to optimize its comprehensive benefits. You might describe the bamboo forest as his research laboratory and his research achievements as the fruits of his arduous work there.

A Companion to Bamboo

Fan hails from Yongtai County, Fujian Province, a land swathed in forest and bamboo. And his love for these things goes back to his childhood. Perhaps this is why he chose to study forestry as his university major back in 1978, when the national college examination was resumed after the Cultural Revolution. He has been committed to it ever since.

Fan was engaged in fir forest culture and ecology before being transferred to ICBR in 2004 in a research and management role. He describes the growth cycle of bamboo as miraculous in that bamboo is cut annually but thrives and will decline otherwise. It matures within three to five years and its shoots can be dug out annually. In addition, bamboo shoots, a delectable vegetable, are dug out yearly but the plant still flourishes and tends to stop growing if not dug out. This makes bamboo a perfect renewable resource. By contrast, if a tree is subjected to such treatment, it will die.

Fan applied his expertise in the effective and precise cultivation of fir trees to bamboo culture. To his great delight, remarkable improvements were made in bamboo yields and ecological functions such as water maintenance and soil-retention. Moreover, bamboo forests have become a leisure destination where transportation is convenient.

Developing Key Technologies for Greater Benefits

Forest is an important national strategic resource, and timber is one of the four internationally recognized raw materials. Due to various factors and pressures, China is currently implementing natural forest protection projects and banning commercial logging of natural forest, and this has created a serious imbalance between wood supply and demand. This is where bamboo comes in.

Bamboo is a renewable and highly adaptive plant, mainly distributed in subtropical and tropical mountains. It is a good substitute for wood and even outdoes it in many respects. According to Fan, China has the largest bamboo resources and the greatest yields in the world. However, it lacks scientific management.

The goal of Fan's research group is to employ scientific management technologies to better the management of low-yield forest. They implement Oriented Intensive Management of the bamboo forest, by basing the distribution of nutrients and water on the patterns of bamboo's requirement of water and fertilizer. They also try to improve the productivity of the forest and reduce the harm that intense intervention may cause. Moreover, they maintain the stability and integrated service functions of the bamboo eco-system by mixing and rotating different plants within the bamboo forest.

Eco-Monitoring for Effective Management

Although bamboo forests have an important function in improving China's ecology, there were no eco-monitoring stations specifically set up for bamboo forests. To fill this gap, Fan's team researched the scientific distribution of eco-monitoring stations, and their findings provided well-grounded documentation to support sound decisions regarding the establishment of a national network of ecological positioning stations, rationally distributed, scientific and effective.

Guided by the State Forestry Administration and ICBR, Fan led his team to apply for the establishment of eight bamboo eco-stations, which formed the basic framework of bamboo forest eco-positioning stations. This has supplemented and perfected the China Forest Ecosystem Observation and Research Network and will support and safeguard the long-term positioning observation of and research on China's bamboo forest resources.

Fan's project "Researching and Demonstrating Key Technologies of Effective Cultivation of Bamboo Resources" won a top Liang Xi Forestry Science and Technology Award. It proceeded from the major needs for resource background monitoring, high-efficient management and health protection in high-effective bamboo resource cultivation. The research focuses on over 20 major bamboo species including *Phyllostachys pubescens*, *Sinocalamus oldhami*, *Dendrocalamus sinicus* Chia et al J.L.Sun, *Neosinocalamus affinis*, *Dendrocalamus farinosus* and *Bambusa rigida* in over 10 areas of China where bamboo resources are concentrated such

as the provinces of Fujian, Zhejiang, Sichuan and Yunnan, and municipalities and autonomous regions.

His team has undertaken 14 national and local science and technology research projects categorized into the National Science and Technology Pillar Program and Program for Transformation of Scientific and Technological Achievements in Agriculture, to name just a few. After many years of effort, in particular the systematic study made during the period of the 11th Five-Year Plan (2006-2010), the team has developed a system of key technologies for effective cultivation of bamboo resources. The system is based on investigations into bamboo resources supported by dynamic monitoring technologies and guaranteed by health protection technologies with key effective management technologies at its core. The team has made great breakthroughs, boosting three major bamboo benefits — economy, ecology and society.

Having rubbed shoulders with ordinary bamboo farmers and conducted grass roots research for over 10 years, Fan has won many honors, among them are: National Excellent Researcher in Forestry Science and Technology in 2006; National Talent in the New Millennium in 2007; and National Excellent Researcher in Science and Technology in 2014.

A Successful Pioneer of Engineered Bamboo

Professor Wang Zheng, chief expert of the Research Institute of Wood Industry, Chinese Academy of Forestry



Wang Zheng is the chief expert and researcher at the Research Institute of Wood Industry, part of the Chinese Academy of Forestry (CAF). Prior to studying bamboo, he specialized in wood science and technology for 20 years. He took to researching bamboo as a material like a duck takes to water, and has scooped up a great many awards for his work.

Great Results in Bamboo Material Research

In 1999, bamboo structure building material based on modern bamboo processing technology was unavailable in China. After much consideration, Wang Zheng put forward the project of “Development of Sympodial Bamboo-and-Plastic Composite.” Undertaking a major study of the various physical and mechanical properties of bamboo and modern bamboo processing technology, he used large-diameter sympodial bamboo as the basic material for research into using engineered bamboo in building structures. This was his first step into bamboo research.

In 2000, Wang Zheng participated in a research project of the 10th Five-Year Plan period (2001-2005) — “Comprehensive and Efficient Utilization of Bamboo.” This used Moso bamboo, the most productive and the most widespread bamboo species in China, to make high-tensile, high-performance building structure material and construction cover board material. Since then, he has traveled faster along the path of engineered bamboo material research.

His dedication to his field of research has won him many awards. “A Study and Demonstration of the Key Technology of Engineered Bamboo Material Manufacture” won the first prize in the National Scientific and Technological Progress Awards of 2007. He has applied for five patents relating to his research results “Bamboo Panels and Structural Sections for Buildings and Structures,” and its relevant research results won second prize in the Liang Xi Forestry Science and Technology Award

of 2009. Building on his research into engineered bamboo material technology, he has presided over and participated in numerous projects, including the national key projects of the 11th Five-Year Plan period (2006-2010), innovation projects of 948 Program (Program on Introduction of Advanced International Science and Technology in Agriculture), programs for converting agro-science research outcomes, and many international cooperation projects.

Using Bamboo in High-End Construction

It was in the 1980s that research began into manufacturing engineered bamboo material using bamboo strips and employing modern process technology such as gluing and hot press. By the end of the 1990s, bamboo strip plywood was in widespread use for concrete formwork, etc.

At that time, some foreign architects were considering using bamboo poles and strip boards for some social housing and calling it “poor people’s building.” Wang Zheng, by contrast, had it in mind to use modern processing technology to produce “engineered bamboo” and apply this in the construction of high-end modern dwellings or villas. In 2004, the unremitting efforts of his team produced engineered bamboo trusses with an 11-m span, bamboo-strip roof panels and wall panels. These were used to good effect in the building of a school in Yunnan.

Wang Zheng has a succession of new technologies and new products. They include: bamboo and wood composite cover board, bamboo-based modular wall panels, bamboo pole structural material, modular wall panels with bamboo pole support, and long-spanned bamboo-based construction beams.

Wang Zheng has participated in the construction of dozens of bamboo structure buildings, ranging from temporary shelters to ordinary dwellings and even to long-span conference halls and luxury villas. He also went to Nepal and Ethiopia to take part in the construction of engineered bamboo material and the building of bamboo homes. Today, “bamboo-based construction material manufacture and construction technology for bamboo-structure housing” are quite mature. New bamboo-based construction material is being widely used in buildings in every region, and is gradually entering China’s bamboo-structure construction market.

Failures Are Inevitable, but Necessary

Wang Zheng has pioneered four areas of engineered bamboo material research in China: he undertook the first research into engineered bamboo for construction and building maintenance; he pioneered the use of engineered bamboo in building construction; he was the first to develop bamboo-based modular wall panels, laying the foundations for fast-track construction of bamboo structure modular houses; and he was the first to use bamboo-and-wood composite wall panels, floor boards and roof sheathing in wooden (bamboo) villas.

On top of this, he put forward the innovative idea of increasing the use of bamboo pole structure and connection method, laying the foundation for bamboo pole applications in modern housing construction. He has participated in the design and construction of long-span bamboo bearing beams. He has also led or participated in the design and construction of various types of domestic and foreign buildings, ranging from fast-track modular houses to ordinary dwellings, right up to up-market villas.

Wang Zheng describes bamboo as a biological material with excellent performance properties, a wide range of possible applications that should not be confined to construction. He predicts that bamboo materials will be used in very many fields, for example in automobiles, rail transportation, drones, ultralow-temperature and high-pressure tanks, and special-shaped load-bearing packaging.

Exploring the Mysteries of Bamboo Genetics

Professor Gao Zhimin, chief expert of ICBR



Gao Zhimin's research spans a wide range: at the macro level he studies bamboo resources and extensively collects bamboo germplasm resources; at the micro level he studies bamboo molecular genetics and delves into bamboo gene resources. He works 365 days of the year; if he's not in the field collecting data on bamboo resources, then he's closeted in his laboratory, absorbed in experimental work. His research results are prolific.

The Siren Call of Bamboo Culture

Gao's earliest encounter with the world of bamboo was in 1994 when he started his MA research on garden plants. The garden bamboos swaying elegantly in the wind captured his heart. What even he could not expect, was that a passionate interest in bamboo culture would take him to a dedicated exploration of the genetic mysteries of bamboo growth and development.

China has untold wealth in bamboo resources and varieties; heaven knows how many secrets they hold, just waiting to be discovered. Before exploring bamboo molecules, on which research on bamboo growth and development is based, it is essential to seek out and conserve bamboo resources on a wide front, and subsequently conduct research in genetic information analysis, gene functions, and development and application of molecular markers.

Gao sees this research as having important scientific and economic value. Bamboo resources are the basis of bamboo breeding and it is important to interpret the genetic mysteries of bamboo growth and development, identify gene functions and explore genetic resources that have important breeding value. They can serve research on molecular breeding of bamboo plants and the creation of new species of bamboo that meet the needs of industrialized use of bamboo.

Probing Bamboo's Genetic Mysteries

Every advance in scientific research comes about thanks to the daring of pioneering and creative figures. Ten years ago, it was quite a new thing to explore bamboo genetics by looking into the patterns of bamboo growth and development at the molecular level. Fortunately, Gao entered this field, overcame one difficulty after another, and produced one achievement after another.

Germplasm is the basis of breeding, and is indispensable for research on the molecular basis and genetics of bamboo growth and development. As a backbone member of the research group, Gao conducted research on the technology of constructing a preservation library of mountain bamboo germplasm resources, and built one in Taiping Test Center in Anhui, collecting and preserving more than 200 bamboo species. This provides the basic resources for bamboo molecular breeding and the creation of high-yield and high-quality germplasm resources, and is of great value to the efficient management of bamboo forest and the sustainable supply of bamboo resources. Gao's "Research on and Innovations of Key Technology of Conserving Bamboo Resources" won him the first prize of Liang Xi Forestry Science and Technology Award.

Gao was among those involved in the creation of the first genome diagram of a bamboo species — Moso bamboo, identifying and annotating 31,987 genes; for the first time people clarified Moso bamboo's evolutionary history and comprehensively analyzed the formation and mechanism of its special physiological processes in order to get genetic information about Moso bamboo.

The diagram filled the gap of the bamboo subfamily in the comparative genomics of the *gramineae*. The findings were published in the international authoritative journal *Nature Genetics*, with Gao as one of the first co-authors. Based on the diagram, Gao led the construction of the first functional annotation and analysis platform of the bamboo genome Bamboo GDB (<http://www.bamboogdb.org>) and had the findings published in another international authoritative journal *Database*.

Using the Moso bamboo genome data, Gao's research team took the lead in developing the SSR molecular markers of the whole Moso bamboo genome and achieved important results. Their findings were published in the international authoritative journal *Scientific Reports*.

The Practical Significance of Gao's Research

Much of his team's research effort is closely linked with bamboo breeding, as part of the National Forestry Science and Technology Plan for bamboo industry development. It is of important scientific value and has application potential.

The genome diagram not only lays the foundation for comprehensive discovery of genetic information on bamboo plants and the identification of gene functions; it also drives research on gene functions, molecular breeding, species evolution

and other related fields of *gramineae* plants. The bamboo genome database can be accessed and used *gratis* by bamboo researchers and others involved. Furthermore, it provides services offering more scientific support for INBAR (International Network for Bamboo and Rattan) members and stimulates more research on the molecular biology of bamboo plants.

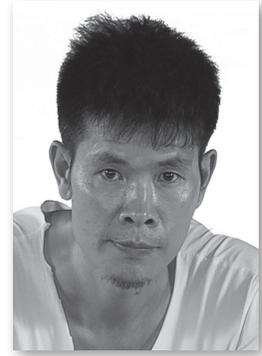
Based on this platform, Gao's team developed 1,098 SSR molecular markers, which provide evidence for the homonym and synonym phenomenon in *Phyllostachys* bamboos; they are also of value for research into genetic mutation and genome analysis of bamboo plants. In addition, they have accelerated molecular marker-assisted bamboo breeding.

Gao is also among the pioneering researchers of gene functions in relation to bamboo cell wall development and the molecular mechanism of bamboo photosynthesis. He has produced a raft of research findings.

Success tends to favor the industrious. In nearly a decade at ICBR, Gao has presided over 10 national, provincial and ministerial research projects including the National Natural Science Foundation of China and National Science and Technology Support Topics and won three prizes including the first prize of Liang Xi Forestry Science and Technology Award and China Forestry Youth Science and Technology Award. He has been granted three national invention patents and published more than 60 academic papers.

The Simple Sentiments of a Bamboo Craft Master

Mr. Liu Jun, chief designer of Urban Complex Design and Research Center, Architectural Design and Research Institute of Tsinghua University



Before he engaged in making bamboo arts and crafts, Liu Jun was earning over RMB1 million a year and was also pursuing a doctorate. What on earth prompted him to give up his white-collar work and start out from scratch in the backwater world of bamboo crafts? It was a sense of connection with nature, a feeling of closeness to bamboo forests, and above all a simple affection for the traditional craft of weaving with bamboo strips that made this senior designer in a listed company change career direction completely.

The Catalyst

Liu Jun moved to the city at the age of 16 in order to study and seldom had time to return to the countryside from then on. But his life in the countryside instilled in him a natural perceptiveness regarding natural materials, something that informed his later designs.

At the Venice Architecture Biennale of 2014, Liu chanced to spot a beautiful bamboo pagoda of fine and simple form. It was made from hundreds of bamboo branches wound together. His first reaction was “What a fabulous Chinese artwork!” But he got a great shock on reading the caption; it was by a Finnish designer! When traveling in Vietnam, the Finnish creator had come across the tallest bamboo he had seen in his life, and this was the inspiration for his piece.

Liu thought: How come this foreign architect, seeing a tall bamboo for the first time, could then create such an exquisite work, whereas he, who had grown up among bamboo forests, saw bamboo merely as fuel...?

For months after returning to Beijing, he kept on seeing that bamboo pagoda in his mind’s eye. He couldn’t figure out the reason why China, this great land of bamboo, had not produced anyone to create such a beautiful work as that Finnish’s piece.

One day, in a Thai furniture shop, he spotted a lovely little rattan chair and immediately bought it for a considerable sum. He took it home and studied it time after time. It brought back memories of childhood days, when so many household objects were made of bamboo. The germ of an idea started to sprout... to combine bamboo materials and craft weaving techniques to make unique furniture. He resolved to contribute to the development of traditional Chinese bamboo weaving by demonstrating to foreigners the creativity of Chinese people and the magic of this ancient craft.

Putting the Spotlight on Woven Bamboo

There were two reasons for Liu's dedication to traditional bamboo weaving craft: one was to collect first-hand material; the other was to promote the revival of traditional crafts through the medium of innovation. While inheriting the craft skills, he retained the traditional features but strived to bring new life to this age-old craft, incorporating functionality and looks in line with modern needs and tastes.

All Liu Jun's woven bamboo pieces are totally hand-made, creating a sense of beautiful modern sculpture. Despite the technical difficulties encountered, he enjoys his new life and is frequently inspired by the interesting things he sees. Many veteran bamboo weavers marvel at his furniture and exclaim: "In tens of years weaving bamboo, this is the first time I've seen furniture like this..."

Liu favors things that are simple and restrained in design. He is a keen advocate of using culture and traditional crafts in order to make people's visual and mental experience simpler. Driven by this conceptual imperative, he advocates the removal of anything extraneous. Wherever possible in his woven pieces, he confines himself to a single material and a single technique.

In his works, subtle and delicate ornamentation best serve the purpose of simple style. Whether designing an artwork or a household item, his emphasis is on simple lines and layering to represent infinity and a natural sense of maturity.

His work *Weifeng*, now part of the art furniture collection at the Yong'an Bamboo World Expo, is a bamboo stool, pebble-like in form, with concise and perfect curves.

Shunning over-embellishment, Liu's woven bamboo pieces are characterized by neat, clean and natural shapes, shapes inspired by traditional bamboo weaving techniques.

Making Bamboo Crafts That Have Soul

In a Tokyo subway station once, Liu came across a perfect geometric figure formed by a configuration of sidewalks and corners. He photographed it without hesitation. The photo later became the material for a craft piece. Using design software, he carefully created the work on his computer and sent it to a sculpture manufacturer to convert it into a metal model. He wanted to use bamboo strips to create the same

work with a metal coating effect, but didn't know how to go about it.

Taking the metal model he went to Quanzhou in Fujian Province to seek help from bamboo craftsmen. The diverse curved surface of his design flummoxed local craftsmen totally. He visited hundreds of possible contenders, dozens of them richly experienced craftsmen, but his quest seemed doomed to failure.

With a glimmer of hope still flickering, he knocked at the door of a legendary bamboo craftsman. The next day they started experimenting, and after a week of process development and material testing, they finally worked out a preliminary outline for the piece. Their tests showed three-year-old *Phyllostachys pubescens* to be the ideal material and would greatly improve the quality of the woven bamboo piece.

Such is Liu Jun's willingness to endure poverty and loneliness for the sake of his craft, so resolutely does he guard his passion for traditional bamboo weaving.

China's First Doctorate in Bamboo Charcoal

Professor Zhang Wenbiao, Zhejiang Agriculture and Forestry University



Professor Zhang Wenbiao has been dubbed “China’s first Ph.D. in Bamboo Charcoal.” To his eyes, deep-black bamboo charcoal is a treasure of people’s lives, culture, art and travel, a friend to mankind, providing great environmental benefits. For many years, he has been dedicated to research into bamboo charcoal and has unlocked many of its mysteries.

Zhang Wenbiao’s main area of study is the industrial utilization of bamboo charcoal and bamboo vinegar. The foresight indicated by his choice of bamboo charcoal as his career has made him a leading figure in the field of bamboo charcoal studies.

The First Doctorate in the Field

In 1999, when Zhang was a postgraduate student, Mr. Chen Wenzhao, “China’s first person of bamboo charcoal,” came to his university to test the physical and chemical properties of bamboo charcoal, and Zhang came into contact with the material for the very first time.

In conversation with Chen Wenzhao he learned that most of the bamboo charcoal produced in China at the time was being exported to Japan, and that, although China could successfully produce bamboo charcoal, research into its properties and application was still virgin territory. This stirred him to action.

At a science research conference, he heard experts predicting a very bright future for China’s bamboo charcoal industry. This deeply impressed Zhang Wenbiao who was then preparing for his future doctoral subject. On the basis of the information gathered, he decided on bamboo charcoal as the subject of his Ph.D. thesis, a choice that determined his future path in life. Under the supervision of Academician Zhang Qisheng of the Chinese Academy of Engineering, Zhang Wenbiao completed his thesis “Study of Bamboo Charcoal and Bamboo Vinegar,” earning him the first doctorate in bamboo charcoal.

Filling the Gap in Bamboo Charcoal Study

Bamboo charcoal is low-carbon and eco-friendly, qualities that gave it bright market prospects. In the late 1990s, the production and application of bamboo charcoal, previously confined mainly to such Asian countries and regions as Japan, South Korea and Taiwan, gradually spread to China's mainland. It had massive potential, but, on China's mainland, production and research of bamboo charcoal were in their infancy, and there was an urgent need for in-depth and systematic studies on key technologies and application mechanisms.

The "application first, research later" situation severely hampered the sustainable development of the bamboo charcoal industry. Zhang Wenbiao and his group played a leading role in bamboo charcoal research in China and elsewhere.

Many factories in China believe that bamboo charcoal has such functions as absorbing harmful gases, purifying water and producing negative ions. But the reasons why bamboo charcoal has such functions were still unknown. Zhang Wenbiao and his group studied and discovered the mechanisms of these functions. The outcomes of their research won the second prize in the 2009 National Science and Technology Progress Awards.

Over 10 years of hard work, Zhang Wenbiao has made great achievements. He has been principal investigator or collaborator in more than 30 research projects, published more than 50 academic papers and won five provincial-level science and technology awards.

On the premise of extending and deepening the technology, Zhang Wenbiao's group has led the way in formulating two national standards and three industry standards, and has won six national invention patents. He has also trained a great many technical staff for bamboo charcoal companies. In recent years, he has been active in hosting international conferences and organizing training classes, events that draw growing attention to bamboo charcoal and gradually extend the application of bamboo charcoal technology and products.

Over the past five years, according to various statistics such as those on Espacenet, Chinese patents relating to bamboo charcoal inventions account for 75 percent of the world total, and Chinese academic papers comprise 54 percent. Behind such impressive numbers lie the contribution and service of Zhang Wenbiao.

Zhang Wenbiao's peer experts speak highly of his research and achievements. Compared with the similar research at home and abroad, they consider Zhang Wenbiao's work to be more comprehensive and systematic, its core technology more creative, and its research results more easily transformed and implemented across a wider range, thereby achieving great strides in forestry technology. The overall technical level surpasses that of similar domestic projects and reaches advanced international level.

Research Achievements Benefiting the People

Zhang Wenbiao works hard to integrate scientific research into the practice of bamboo charcoal companies, to effectively promote the sustainable and healthy development of bamboo charcoal producing and processing companies and to realize the transformation and upgrading of the industry. Such efforts are helpful in raising added value in bamboo processing, increasing the incomes of bamboo farmers, and generating economic, social and ecological benefits. And a bamboo charcoal industry cluster, influential in China and overseas, has come into being in Suichang County and Qujiang District, Zhejiang Province. These areas are known as “the hometown of Chinese bamboo charcoal.”

Under his leadership, his group has developed nine categories and about 400 bamboo charcoal products for the companies. In one project alone — “Research on the Key Production Technology, Application Mechanism and Product Development of Bamboo Charcoal” — the results have helped generate economic benefits amounting to RMB5 billion and helped some 50,000 into employment. According to incomplete statistics, the economic profits radiating from the bamboo charcoal industry surpass RMB10 billion. The research results have been put into reality, to the great benefit of the people. Through training, publicity, demonstration and technology export, their research results are rapidly spread and employed in bamboo producing areas overseas. Charcoal production technology has been transferred to some Asian, African and South American countries.

Zhang Wenbiao has advanced the development of the bamboo charcoal industry, which, in return, has made Professor Zhang. His research gives theoretical support to the industry, and its development potential brings Zhang Wenbiao a new target to strive for.

Pioneer of Research into Comprehensive Utilization of Bamboo Biomass



Professor Zhou Jianbin, Nanjing Forestry University

Zhou Jianbin is a top expert in the field of bamboo science and research. Now 51, he has long been engaged in teaching and research relating to the scientific, rational, and industrialized utilization of bamboo resources. He has made outstanding contributions to the development of China's bamboo industry.

Starting a Life Attached to Bamboo

In 1989, Zhou Jianbin, having majored in Chemical Processing of Forest Products, graduated from Nanjing Forestry University and stayed on there to teach. Shortly into his teaching, he began studying bamboo charcoal and activated charcoal with bamboo as the raw material. This was his earliest contact with bamboo.

However, at that time, the academic world and the activated charcoal industry gave insufficient importance to bamboo, since, belonging to the grass family, its ash content is higher than that of wood or nutshells. Around 2000, it became common in Japan, South Korean and Taiwan of China to use bamboo as a raw material for charcoal. Since then, bamboo charcoal studies started to receive greater attention.

The New Industry of Bamboo Charcoal

In 2001, Zhou Jianbin embarked on his doctoral degree under the supervision of academician Zhang Qisheng. It was the start of an inseparable connection with bamboo (rattan).

Under his supervisor's guidance, Zhou Jianbin gave himself to studies into the basic properties and production methods of bamboo charcoal and to research into activated bamboo charcoal. In the course of a few years, he completed thousands of experiments and data analyses and made significant progress in his research. He discovered the mechanisms of absorption, negative ion release and infrared health of bamboo charcoal, findings that completely overturned the conventional belief

that bamboo charcoal is inferior to wood charcoal. Comparing bamboo charcoal with wood charcoal, he found that the large-diameter holes in bamboo charcoal better absorb macromolecular substances. Also, the high permeability of the bamboo fiber cell wall, in addition to easier absorption, makes for easier desorption too. Furthermore, bamboo charcoal ash is rich in medium and trace elements.

Zhou Jianbin's research has also revealed the yield rate of bamboo charcoal at different temperatures, the rules governing changes to its pH value and specific surface area. These findings provided an important theoretical basis for his later systematic studies relating to the production and industrialization of bamboo charcoal and bamboo vinegar.

He studied and developed a set of deep processing technologies of bamboo charcoal and bamboo vinegar, developed seven lines of bamboo charcoal products and created China's emerging bamboo processing industry. Put into practical use in Zhejiang and Fujian provinces, these technologies produced remarkable economic, social and ecological benefits.

Building on Chinese and foreign charcoal production technologies, Zhou Jianbin developed pyrolysis production technology and equipment, which consumes no external energy under normal conditions, and built the world's first automated charcoal production line with an annual output capacity of 3,000 tons.

Opening Up the New World of Biomass Utilization

Because bamboo resources are not infinite, raw material supplies were insufficient to meet the needs of large-scale industrialization, and this seriously hindered the application and promotion of the technologies. For some time, Zhou and his team were in a fix.

Under the guidance of academician Zhang Qisheng, Zhou Jianbin devoted himself to research into biomass (of bamboo, etc.) gasification-power generation charcoal (bamboo charcoal, etc.) and liquid fertilizer, and put them into mass production.

His integrated innovation and industrialization research relating to biomass gasification technology to produce electricity, carbon, fertilizer or heat (cold) has produced results of great significance for biomass energy, for activated carbon production, for biomass carbon and for the fertilizer industry. The research results have been widely employed in provinces such as Hebei, Hunan, Anhui, Jiangxi and Yunnan, and have delivered great economic and environmental benefits.

This research result has dramatically changed the history of traditional biomass gasification (energy). In addition to biomass energy (electricity generation and heating), biomass charcoal and fertilizer can also be produced. It has turned the production of activated charcoal on its head: the traditional method required coal firing, but this technology needs no external energy. It has dramatically changed the world's three-millennia-old coal-burning history. The technology solves traditional

coal-burning's disadvantages such as environment pollution, low efficiency and labor intensity. It has dramatically changed the history of fertilizer. The use of charcoal-based and biomass extract fertilizers can directly reduce total fertilizer consumption by between 10 percent and 30 percent, and can also help restore degraded and polluted soil.

Enduring Hardship and Putting the Bamboo Spirit into Practice

Zhou Jianbin says scientific research needs people with the qualities possessed by bamboo — the ability to explore and concentrate deeply and, more importantly, resilience and the ability to withstand hardship and pressure. His group's research and industrialization of biomass (bamboo, wood processing leftovers, nutshells and straw) pyrolysis-gasification-power generation charcoal (bamboo charcoal, wood charcoal, activated charcoal and charcoal-based fertilizer) and liquid fertilizer encountered many difficulties on the way. No achievements would have been possible without strenuous effort and dedication.

The vast majority of Zhou's time is spent in the lab and at the enterprise's production front line. If a project needs adjustment, he will stay there for more than ten days at a stretch. He often works late into the night, and sometimes doesn't see his bed until two to three a.m.

In the course of promoting his research results, insufficient understanding of the new technologies and products often creates barriers. He always explains patiently and demonstrates them in person, eventually winning approval by reason of the practical effects.

He has presided over and participated in some 30 important national scientific research projects and has published many articles and books. He was a winner of the first and second prizes of the National Scientific and Technological Progress Award and was selected as an Outstanding Talent of Jiangsu Province.

Now in the prime of life, Zhou Jianbin carries on the bamboo spirit of perseverance. He continues striding forward on his research path — the comprehensive utilization of biomass resources.

Molecular Studies Explain the Advantages of Bamboo Materials



Professor Yu Yan, deputy director of the Key Open Laboratory on Bamboo and Rattan Science and Technology of the State Forestry Administration, and chief expert of ICBR

Bamboo has excellent mechanical properties. Its strength and toughness are superior to those of wood, it has moderate rigidity and it can be used in very many circumstances. But do you know why bamboo possesses these desirable qualities? The deputy director of the Key Open Laboratory on Bamboo and Rattan Science and Technology of the State Forestry Administration Yu Yan, has spent over a decade exploring the answers to this question at the levels of nano-technology and molecular study. Yu Yan is also the leader of non-wood forest products bamboo and rattan team under Department Five of the International Union of Forest Research Organizations (IUFRO), secretary general of the Bamboo and Rattan Technical Committee (TC 296) of the International Organization for Standardization and the international project evaluation expert of the International Tropical Timber Organization (ITTO).

The term “nano” has kind of magic to it, and has attracted the exploring eyes of many since it came into being. Yu Yan studies the internal mechanism of bamboo’s excellent mechanical properties at nanometer and molecular level to answer the question why bamboo has strength and toughness superior to those of wood but has moderate rigidity.

He carried out China’s earliest fundamental research relating to exploration and application of technology to test the mechanical properties of bamboo (wood) cell walls, overcame the internationally vexed question of mechanical testing of short fiber in single root plants, and successfully developed China’s first specialized mechanical test instrument for short-fiber plants and put it into commercial production. He pioneered the introduction of nanoindentation technology into wood and bamboo science in China, was the first to practice nanoindentation testing of the wood cell wall in a liquid environment and created a test methodology.

The above mentioned technologies have played important roles in studies of the relations between properties and structure of wood cell walls and have great

application value in such fields as tree growth, wood modification, wood gluing and early forecasting of mechanical properties. Dr. Yu also systematically studied the multi-scale mechanical properties of bamboo, based on the cell wall mechanical characterization technology developed by himself. He explained the mechanisms of bamboo's strength and toughness at the cellular level, and also provided crucial fundamental mechanical data for the design and development of high-performance bamboo-fiber-based composites. His research attracted the attention of 90-year-old German Professor Walter Liese. Walter Liese, former president of IUFRO and the international authority on bamboo science, wrote to him requesting related research papers.

In recent years, Yu Yan has used the results of fundamental research to guide application, paying special attention to technologies for improving the green functions of bamboo material. He put forward technologies for furfural resin modification and hot water circulation to prevent mildew on green bamboo, which helped solve the knotty technical problem of bamboo material being prone to mildew. Yang Fang, general manager of Hunan Dongliang Wood Industry Co., Ltd. commented: "The furfural resin modification technology proposed by researcher Yu Yan has been used successfully to improve the function of plantation wood, and is being tried out in commercial production right now. I believe it will have a place in improving the function of bamboo material."

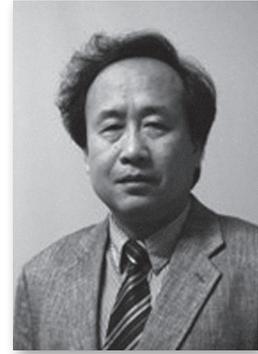
Yu Yan's love for bamboo is uncomplicated, as was his initial purpose in pursuing bamboo research. He declares bamboo an amazing plant, being neither grass nor tree but as fast-growing as grass and with better mechanical properties than wood. China has the world's richest bamboo resources and a huge potential to explore. However, bamboo research lags far behind wood-related research, and there are vast areas still to be explored.

Yu Yan is a very erudite and diligent researcher. Over the past ten years, he has been in charge of a dozen national and provincial scientific and research projects and published more than 120 articles in important journals, over 60 of them included in the Science Citation Index. He has co-authored three books and acquired four patents as the first inventor and one new practical patent.

Yu Yan says bamboo is a magical plant holding many secrets yet to be explored and discovered. It is a prospect that fills him with enthusiasm and expectations for future research.

Using Bamboo in House and Bridge Construction

Professor Xiao Yan, dean of the College of Civil Engineering, Nanjing Tech University



The global shortage of construction materials is a worrisome issue. What materials can be used to replace steel and cement, for so long the dominant material? Since the start of the 21st century, bamboo as construction material has gradually become the focus of reexamination and exploration.

Prefabricated mobile bamboo houses, independent bamboo houses and bamboo bridges have become part of the new landscape in China's Hunan and Beijing and in some African countries. These were designed and built by Professor Xiao Yan, dean of the College of Civil Engineering, Nanjing Tech University, and his research team.

Xiao Yan, a graduate in civil engineering from Tianjin University, studied and worked for more than two decades in Japan and the US, where wooden buildings are very common. Stimulated by his great interest, he acquired an in-depth understanding of wooden structures.

In 2001, Xiao Yan returned to China as a winner of the Yangtze River Scholar award and a distinguished professor of Hunan University. Always on his mind was the possibility of replacing wood with bamboo in modern buildings.

Bamboo, dubbed “the botanic steel,” has been used in many fields to replace wood and other high energy consuming materials. In the past, bamboo was used only as an adjunct material in building houses, or bamboo poles were used only to build temporary houses: modern bamboo buildings are very rare. Lack of a modular production pattern and of systematic industrial production and construction technologies are the chief reasons for this rarity.

Today, the new modern bamboo structures designed by Xiao Yan's team can not only meet the demands of industrial production and design but are widely applicable in various fields, thanks to their modest cost, speed of construction. They are not at all inferior to steel, concrete and masonry structures in terms of safety.

Graceful and Distinctive, the Bamboo Villa

With the support of the International Network for Bamboo and Rattan, Professor Xiao Yan and his project team built the world's first four bamboo villas, which are located, one apiece, in Hunan University, Beijing's Purple Bamboo Garden, Kenya, and Uganda.

All the columns, beams and walls of the bamboo villa in Hunan University are made from bamboo or bamboo-wood components. The style is original and elegant. The insulated walls are of bamboo-wood structure. The architectural form and functions of the sample bamboo villas are identical to those of wooden villas in North America and Europe.

Xiao Yan said that the construction of bamboo houses is less time-consuming and basically unaffected by the climate. The structural components can be made on site or prefabricated in the factory. All pipework in the bamboo structure is installed in the walls or in the floors. The percentage of usable dwelling area of the bamboo houses is some 8 to 10 percent higher than in concrete block houses, but they have the very similar construction costs.

Bamboo is a natural organic polymer. Its organizational structure is mainly composed of vascular bundle and parenchyma cells. The internal cavity of bamboo makes for slow heat conduction, giving it excellent thermal insulation performance. In addition, the walls of the bamboo houses are filled with insulation. Such things improve the thermal insulation performance of the bamboo houses and decrease their energy consumption in use.

Safe and Easy to Build

Xiao Yan also developed a type of mobile bamboo house, which employs modular design and production. This enables rapid dismantling, transportation and reassembly.

After the Wenchuan Earthquake in 2008, temporary housing was urgently needed in the quake-stricken area. Xiao Yan and his research group quickly produced a batch of modern movable bamboo houses, which were transported to the quake area. Their good performance has won favorable comments from the local people.

The bamboo house is very safe. Experiments show that even in violent earthquakes, the bamboo house does not deform, fall apart or collapse; rather it moves as a whole, like a box. Compared with concrete buildings, even if a bamboo house does collapse, it does so leaving more survival spaces, facilitating rescue.

The Primitive Simplicity of the Bamboo Bridge

In the hands of construction engineer Xiao Yan, bamboo can be used to build both houses and bridges.

In 2007, Xiao Yan led his research group to build Leiyang Bamboo Bridge in

Shangxun Village, Hunan Province, which opened to traffic within the same year. Leiyang Bamboo Bridge was the world's first modern bamboo bridge capable of handling trucks.

The modular approach was taken in the design and construction of Leiyang Bamboo Bridge. This allows individual major components to be rapidly replaced; also, if necessary, the bridge can be dismantled and relocated as a whole.

In 2008, this seemingly ordinary rural bridge was built using a technology named by the US magazine *Popular Science* in its "Best of What's New in 2008" feature.

Xiao Yan's group also built the bamboo pedestrian bridge on the campus of Hunan University and two bamboo pedestrian and landscape bridges in Dongguan City, Guangdong Province, which are 40 and 20 meters long respectively.

The latest creation of Professor Xiao Yan and his group is the bamboo space truss, which can be used in the roof structure of large-span buildings. Recently, one of the college graduates supervised by Xiao Yan designed and built a 10-meter-long building canopy at Nanjing Tech University. Although light and beautiful, it supports the weight of toughened glass.

It is becoming internationally recognized that bamboo structures are environment-friendly and renewable.

Dedicated Research on Bamboo Development and Utilization



Dr. Wang Ge, research fellow, ICBR

“In love with bamboo for some 20 years, and committed to a lifetime with it,” — such is the dedication of Wang Ge, research fellow at ICBR. He brings a craftsman’s spirit to his scientific research and focuses on developing the utilization of bamboo.

Dr. Wang Ge is a research fellow at the ICBR, doctoral supervisor and selected in the “National Millions of Talents Project” at a provincial- or ministerial-level. From the outset, he has made bamboo and rattan the object of his sci-tech studies, producing a host of research outcomes. He has presided over more than 30 national-level scientific research projects, and obtained eight sci-tech achievements verified at provincial or ministerial level and 10 national invention patents; published some 130 papers, 30 of them included in the SCI (Science Citation Index); and edited three books. He currently presides over the bamboo processing project included in the key research and development program of the National 13th Five-Year Plan (2016-2020). In addition, Dr. Wang Ge has won many major prizes, including a first prize of the National Science and Technology Progress Award, three Liang Xi Forestry Science and Technology Awards, and two SWST (Society of Wood Science &Technology) Awards. At present, he concurrently works at a social level in related areas, serving as secretary general of the National Technical Committee for Bamboo and Rattan Standardization, secretary general of the Bamboo Utilization Committee of Chinese Bamboo Industry Association, deputy director of the National Engineering Research Center for Bamboo and Rattan, and deputy director of the Engineering Research Center for Bamboo Winding Composites (ERCBWC), contributing his strength to China’s bamboo and rattan research and development of the industry.

Innovating Technology Applications of Bamboo Fiber

Dr. Wang Ge and his team focus on the processing and utilization of bamboo fiber. In R&D of long bamboo fiber, they have conducted studies on manufacturing

process, structural design, bonding interfaces and physical and mechanical properties, and developed bamboo fiber for textiles, bamboo bundle laminated veneer lumber (BLVL), bamboo-wood hybrid laminated composites and bamboo winding composites. In R&D of bamboo short-fiber composites and related products, they have developed China's first micro-tensile high-precision tester and testing technology for any single short plant fiber, and successfully applied it to characterization of mechanical properties of plant fibers (including bamboo and wood), making China a world leader in this field. Moreover, he has used residue of short bamboo fiber to develop core-shell structure bamboo-plastic composites and molding materials.

Major breakthroughs have come about from the team's years spent in research and tackling key problems, using an approach that combines scientific rigor with craftsman's spirit. They developed natural bamboo fiber splitting technology for textiles, improved bamboo fiber textile processing technology, studied quality identification in bamboo fiber, and created two systematic identification standards and methods. They developed a new type of bamboo-structure prefabricated part for composite wall, and built a sample solar-powered prefabricated bamboo house. They fully utilized the characteristics of sympodial bamboo and poplar to manufacture structural timbers, and developed engineered bamboo materials of large size (continuous length) and bamboo double beams for house construction, meeting the construction needs of forest regions, small towns and tourist attractions. And they created the concept and technology of bamboo winding composite pipe processing, a major breakthrough in the hot pressing technology of wood-based panels. Yu Wenji, research fellow at the Chinese Academy of Forestry and long-term partner of Dr. Wang, commented, "Dr. Wang Ge has a unique vision and approach towards the utilization and research of bamboo fiber."

Dr. Wang spoke humbly of his achievements: "Without strong support from national policies, the visionary arrangements of the leaders of the State Forestry Administration and the ICBR, the INBAR and national research platform, and joint efforts of team members, the bamboo industry would not have seen rapid development and our bamboo fiber composites research group would have made no achievements; it was the times and the industry that chose us, gave us the opportunity to display our talent and entrusted to us the great mission of creating a better life with bamboo!"

Addressing Real Development Needs

In the final analysis, according to Dr. Wang, technological innovation aims to support development of the bamboo industry, and so his research work is always concerned with the developmental needs of enterprises. The eminent bamboo expert Fei Benhua said of Dr. Wang, "He has formed close ties with bamboo processing

enterprises, and done well in integrating scientific research with the bamboo industry.” Chairman Lin Hai of Zhejiang Dazhuang Bamboo Company praised him, “Dr. Wang Ge has provided great technical support for the development of our bamboo processing enterprises.” In recent years, Dr. Wang has provided technical services to 11 enterprises in seven provinces and autonomous regions, creating good social and economic benefits. He has participated in the planning of bamboo industrial parks in Sichuan Province’s Luzhou and in Yunnan Province; given lessons in 10-plus training classes on processing and utilization of bamboo and rattan held by INBAR and the Ministry of Commerce, and trained more than 300 people; taught at more than 10 training courses on new bamboo processing technology for producing areas in China, and trained over 1,500 people. “Solving technical problems for enterprises and training bamboo and rattan personnel for the world is the bounden duty of every bamboo and rattan researcher.” Wang Ge has matched his actions to his words.

The manufacturing and identification techniques of bamboo fiber for textiles developed by Dr. Wang Ge and his team have been used by Hunan Huasheng Zhuzhou Cedar Co., Ltd. They have solved processing and identification problems such as softening and combing the raw materials, and now produce bamboo fiber cushions, summer sleeping mats and jeans. The cost of bamboo-wood composite plywood developed by Dr. Wang Ge and his team is lower than that of traditional bamboo-mat plywood. Therefore, it has been used in the construction of bamboo-wood structural houses in Wuxi, Jiangsu Province, playing a model role displaying its special advantages. On the basis of improving the quality and increasing the benefits of traditional bamboo products, the research team actively meets the needs of national supply-side reform. They have developed new technology and products including bamboo container assembly housing with low energy consumption and bamboo ionic air purifier, which can be used in promoting ecological progress and constructing special-feature townships.

Dr. Wang is fond of describing bamboo as mankind’s greatest gift from God. “It represents a green and healthy lifestyle and the qualities of resoluteness, modesty and perseverance. We should protect and make good use of this gift by means of science and technology. The bamboo and rattan industry is a sunrise industry with great development potential. There is much R&D work that I can do in this field, and I will keep on contributing my strength to it.”

“The Present-day Cai Lun”

Dr. Fang Guigan, deputy director general of the Forest Products Chemical Industry Research Institute of the Chinese Academy of Forestry, and academician of the International Academy of Wood Science



Dr. Fang Guigan has many titles. He is deputy director of the Forest Products Chemical Industry Research Institute of the Chinese Academy of Forestry, director and chief expert of the Center for Pulp and Paper Research and Development, and academician of the International Academy of Wood Science. For many years, his major areas of focus have included bamboo high-yield clean pulping technology, and effective wastewater treatment. Cai Lun was the inventor of paper-making technology in China some 2,000 years ago. Dr. Fang has been dubbed the “Present-day Cai Lun” for his remarkable achievements in scientific research and development of engineering technologies.

A Graduate Brings a Paper Mill Back to Life

Fang was just 16 years old when he went to university. Born to a family of farmers, when he went to university in Xi’an, he had to make the train journey alone. Unable to speak Mandarin well, he had trouble making himself understood with the notice of admission before the ticket seller sold him the right transfer ticket.

In pursuit of a master’s degree, Fang studied under the authority on bamboo cells Wang Juhua of the China National Pulp and Paper Research Institute to complete his thesis on bamboo cells.

During this period, Fang single-handedly helped out a paper mill in Anhui Province by making the stiffness of its corrugated paper measure up to Chinese national standards. This experience drove home to him just what science and technology could achieve.

Subsequently, Fang continued his research overseas, at the Commonwealth Scientific and Industrial Research Organization (CSIRO) in Australia, the Canadian Paper Research Institute, Quebec University in Canada, Bordeaux 1 University in France and the Training Center for Forest Products Industry in Sweden, either as

a visiting scholar or a research collaborator. During 1999-2002, he was an external professor in Bordeaux 1 University. At that time, China's experimental techniques and equipment of pulping and papermaking were quite backward. Therefore, Fang was committed to his work and learned all he could. He read voraciously, acquiring new knowledge and experimental technologies, assisted by foreign advanced technologies and equipment.

Environmental Breakthroughs in Bamboo Pulp and Paper

Fang was well aware that although China had the world's largest output of paper and paperboard for many years, its paper industry faced two major problems: there was a serious shortage of wood fiber raw materials for papermaking; and the industry topped all others in terms of wastewater pollution.

Burning with patriotic spirit, Fang let go his opportunities of personal career development abroad and returned to China. Back home, with a solid theoretical foundation and a passion for his career, he committed himself to research on new technologies for reducing pollution from pulp and paper manufacturing, industrial recycling economy and wastewater treatment, renewable resources and environmental protection, etc. He also engaged in engineering design, consultation and services, helping translate sci-tech results into industrial products.

His team has developed bamboo clean pulping technologies and found a new way of developing bamboo paper, thereby easing the shortage of wood fiber raw materials and keeping wastewater pollution under control.

Fang has presided over research on new bamboo clean pulping technologies, which increases the utilization of bamboo raw materials from 45 percent to 74 percent. This achieved a national first in making A-grade corrugated base paper and mixed high-strength box board paper out of bamboo pulp. His new technologies for treating wastewater from bamboo pulp processing reduce pollution by enabling the wastewater resulting from 20,000 tons of bamboo pulp produced daily to consistently meet the required standards.

So far, Fang has applied for 27 invention patents, 11 of them granted. Among the latter is the method of making furfural, a chemical substance, by means of two-step hydrolysis of biomass. It was the first time in China that furfural was made out of bamboo waste in this way. He has over 200 papers published in Chinese and foreign journals and wrote the chapter "Clean Bamboo Pulp and Paper" in an English monograph entitled *The World Bamboo and Rattan*.

Fang has undertaken national science and technology projects both for the Eighth Five-Year Plan Period (1991-1995) and the 12th Five-Year Plan Period (2011-2015). Notable breakthroughs were the use of bamboo biomass and wastewater treatment in his project "Researching and Developing New Technologies for Bamboo High-Yield Pulping and Efficient Wastewater Treatment" for the National Science & Technology

Pillar Program during the 12th Five-Year Plan Period. He has just undertaken the national project “High-Efficiency and Low-Cost Treatment Technologies of Bamboo Pulp High-Concentration Wastewater” for the promotion of scientific and technological achievements, which will facilitate the upgrading of wastewater treatment in bamboo pulp mills, contributing to energy saving and emission reductions among bamboo pulp enterprises in the southeast and southwest of China.

Making Bamboo a Source of Social Benefits

The new technologies and equipment pioneered by Fang’s research team solved a major problem for China’s paper industry and have been taken up by major paper groups in China and overseas; they have achieved significant social and economic benefits. So far, seven China-made non-polluting pulp equipment production lines have been built in China, breaking the longstanding foreign monopoly on high-yield clean pulp production lines.

In the past 10 years, Fang and his team have transformed over 40 of their scientific and technological results, making contributions to China’s ecological conservation and natural energy saving. Statistics from 10 enterprises utilizing their technologies indicate that their application has saved about 3.2 million cubic meters of high quality wood, 395 million kWh of electricity and 15.8 million cubic meters of clean water, and reduced COD (chemical oxygen demand) emissions by 126,400 tons and carbon emissions by 252,000 tons.

Environmental benefits come with economic benefits too. The GDP of these enterprises has increased by more than RMB7.9 billion in total, creating direct economic benefits of RMB1.24 billion, and adding RMB761 million to the income of forest farmers. On its own, the GDP of one bamboo pulp and paper company based in Chishui City, Guizhou Province accounts for one-tenth of Chishui’s total GDP, and makes a massive contribution to local economic development.

Fang has great affection for bamboo. As he says, “China leads the world in terms of bamboo area under cultivation and output. We forestry researchers have a duty to keep on innovating.”

Promoting Ornamental Bamboo for Landscape Gardens



Professor Chen Qibing, dean of the College of Landscape Architecture of Sichuan Agricultural University and deputy director of the Bamboo Division of the Chinese Society of Forestry

Professor Chen Qibing's career in bamboo started when the fate of giant panda was threatened, and it is a field that continues to fascinate him.

In the early 1980s, large swathes of bamboo forest in the high mountains of Sichuan Province began to flower simultaneously, seemingly overnight, creating a survival crisis for the giant panda. This caused the young Chen Qibing, fresh out of university, to devote a lifetime's energy to the study of bamboo.

Chen's studies focused on sympodial bamboo, ornamental bamboo and cultivation of bamboo, and he has made remarkable achievements in each of these areas. His research topics have one thing in common, namely that they meet actual needs. He moved his laboratory out into the field, and turned his research results into economic benefits and beautiful scenery.

A Paltry Research Budget to Start with, but Good Results

Today's Chen Qibing is a well-known industry expert, holding several concurrent posts, including dean of the College of Landscape Architecture of Sichuan Agricultural University, member of the Appraising Group of Landscape Architecture Discipline of the Academic Degrees Committee of the State Council, and deputy director of the Bamboo Division of Chinese Society of Forestry. Chen's research has produced fruitful results, notwithstanding the fact that it all started with a project with a budget of just RMB1,000.

It was this modest sum that allowed Chen Qibing's glittering career to take off. Sichuan Agricultural University, under Chen's leadership, is preeminent in research on sympodial bamboo in China. In terms of research emphasis, the university has reached leading level in the study of ornamental bamboo, and advanced level in the study of edible shoot-use bamboo and fiber-use bamboo; in terms of research progress, the university launched a major project relating to the bamboo industrial

chain in Sichuan and other regions of Southwest China; its specific target was systematic research on fiber-use bamboo, shoot-use bamboo and ornamental bamboo. These studies solved the problem of timber shortage and difficulties with bamboo fiber; solved the problem of rising demand for forest food, especially shoot-use bamboo; and integrated ornamental bamboo with bamboo forest eco-tourism, enriching the tourism space, embodying more eco-environment-friendly progress, and spreading China's bamboo culture.

Inspired by Needs of Enterprises and Growers

Most of his bamboo research projects target major issues in production and problems encountered by enterprises and bamboo farmers. Cases in point include: "Key Technologies of Production Recovery and Demonstration for Important Economic Bamboo Species Stricken by Freezing Rain and Snow Disasters," a project in the National Science & Technology Pillar Program during the 11th Five-year Plan Period; and "Study on and Industrialization Demonstration of Cultivation Techniques of Sympodial Bamboo in Sichuan"; and "Study on the Technology of Bamboo Special Fertilizer," these last two projects were for the Ministry of Science and Technology during the 11th Five-year Plan Period.

In the early spring of 2008, large areas of bamboo forest were devastated by freezing rain and snow. Afterwards, Chen Qibing led his research team in conducting eco-environmental investigations on bamboo in the affected areas, diversity assessment on bamboo species (animals), investigation on plant diseases and insect pests of major bamboo species, study on forest productivity recovery technology in the disaster area, physiological determination of resistance of bamboo species, research on post-disaster bamboo cultivation technique, collection of bamboo germplasm resources, research on the establishment and demonstration of resources nurseries. They produced a number of innovative research results in key technologies, providing technical reserves for response to such disasters in the future. During the three years that the project ran, they popularized new technology in 49 counties (districts) of Yunnan, Guizhou and Sichuan provinces and Chongqing, with a radiating area of over 2 million *mu* (133,400 hectares), stimulating an increased output value of over RMB1 billion in various bamboo producing areas.

In Chen Qibing's view, the problems faced by enterprises and bamboo farmers are no small matter "I often get letters from enterprises and bamboo farmers asking for help. Every time, I carry out targeted research, I do all in my power to solve their problems."

Bamboo in Gardens for Beautiful Views

"Bamboo gives him design inspiration and Chen gives an artistic life to bamboo." Such was one journalist's take on Chen Qibing.

Chen deploys ornamental bamboo in garden making, combining the natural and the manmade, blending bamboo's artistic beauty and culture to create vistas of breathtaking beauty.

One of his team's representative design works is Muchuan Chinese Bamboo Garden. It is located in Muchuan County, on the outskirts of Leshan City. Chen believed the Chinese Bamboo Garden to have clear location advantages and cultural particularity, giving it tremendous space for development and market potential. Therefore, Chen and his team built it into the largest, best and newest expo park of bamboo culture in China. It took bamboo species resources as the foundation, Chinese culture and bamboo culture as the soul, market demand as the orientation, and sightseeing, education and research and eco-experience as the theme.

It is because of their fixed focus on the practical issues of bamboo forest management, and on market needs in developing and utilizing bamboo resources, that Chen and his team remain inspired and vigorous in their bamboo research cause.

Dr. Jiang and Team Help Upgrade Bamboo Industry in Mountain Areas



Dr. Jiang Jingyan, President of Yong'an Institute of Bamboo Industry (YIBI)

Nowadays, Fujian Province's Yong'an City is attracting attention: the International Bamboo and Rattan Organisation (INBAR) follows Yong'an with interest; the National Scientific and Technological Demonstration Zone of Bamboo Industry has been set up there; and it has been the venue for the International Bamboo Products Design Contest, the International Bamboo Products Expo, the International Bamboo Forum and the International Bamboo Fashion Trend Release Conference. In 2015, the total output value of its bamboo industry reached RMB5 billion. There were 180 bamboo shoot and bamboo processing enterprises and 23 bamboo processing enterprises with individual output values in excess of RMB100 million, providing employment for over 50,000 migrant workers.

Dr. Jiang Jingyan has played a key role in helping the bamboo industry "overtake on the bend." Yong'an brought in Dr. Jiang to establish the Institute of Bamboo Industry, using innovation to create new public- and platform-oriented systems of sci-tech services and to forge a new path for the leapfrog development of the bamboo industry.

Privately Operated, Government Supported Platform

How did the inland mountainous area of Yong'an bring in this expert from the coastal region? In August 2011, following an in-depth survey of the local bamboo industry, Huang Jianping, the new secretary of the Party committee of Yong'an, suggested inviting in a specialist team to draw up a development plan for the industry. Dr. Jiang Jingyan's team stood out from competing consultant teams.

On October 18, 2013, the Yong'an Institute of Bamboo Industry was established. It is a privately-run, government-supported platform providing bamboo technology services to the public. With Jiang Jingyan as its president, the institute focuses on building and improving the public service platform, integrating the functions

of industrial technology planning, design & development, intellectual property transactions, public testing, start-ups support, and industry promotions.

The physical space of the Yong'an Institute of Bamboo Industry comprises just one office, over 100 sq m in area. The place is nothing special but the people most certainly are: the crack research team consists of three professors, three associate professors and six PhDs.

According to Zhang Qisheng, academician of the Chinese Academy of Engineering and professor of Nanjing Forestry University, the Yong'an Institute of Bamboo Industry, as a technology and policy research institute, has played an important role in forestry innovation and improvement of its core competitive advantage.

Design Helps the Bamboo Industry Raise Its Game

It was Jiang Jingyan who organized an international bamboo design competition, the only one of its kind in China at that time. Over the past five years, more than 10,000 designers from over 20 countries and regions including Italy, the US and Japan and 25 Chinese provinces (cities and regions), and some 200 universities and design agencies at home and abroad have participated in the competition, creating 6,900 amazing innovative works, and greatly enhancing the added value of industrial design in the application of bamboo.

Technical Service Helps Enterprises Overcome Difficulties

Jiang Jingyan and the Yong'an Institute of Bamboo Industry that she leads provide enterprises with sci-tech services to help them transform and develop, and to help them overcome difficulties in the process. His team conducted market research in 10 large and medium-sized cities across China, comparing the latest fashions in bamboo furniture with those of wood furniture and steel furniture. Their design work won two international awards at an exhibition of well-known furniture brands.

“With attentive services at reasonable prices from the institute, and financial aid for technical transformation from the government, our program is progressing well,” enterprise boss Ding Jian'an comments. “The Yong'an Institute of Bamboo Industry gives us confidence for transformation and development. Now, our company has more than 30 franchised stores in China.”

Exhibition to Invite Better Targeted Investment

The International Bamboo Products Exhibition has been upgraded to the International Bamboo Products Expo. This has made the organizational task way more complex.

Guided by Jiang Jingyan, the China Bamboo Wares Brands Union, with Yong'an's “Bamboo World” as its base, has been joined by more than 140 bamboo enterprises

from 18 provinces, cities and regions in China. It does a good job in promoting industry information connectivity, industrial transformation and upgrading, and brand building for enterprises.

At the recommendation of Lai Xuegui, dozens of enterprises from Jiangxi Provincial Bamboo Industry Association participated as a group in the International Bamboo Products Expo.

Liu Guangsheng, secretary-general of Jiangxi Provincial Bamboo Industry Association comments, “Previously, during our efforts to invite investments it was hard for us to communicate with enterprises; now, Jiang Jingyan and the Yong’an Institute of Bamboo Industry have built a bridge for communication and cooperation between government and enterprises, and this really helps in our work inviting investments.”

Jiang Jingyan enumerates the three “Internet Plus” projects launched by Yong’an to date: “www.cbamboo.cm”, “Bamboo Life. Online Bamboo Furniture” and “Red and Black Garden.” In addition, it has established the Oracle (Yong’an) Smart City & Industrial Innovation Research Institute, Fujian Cloud Bamboo Technology Co., Ltd., and Fujian Province Bamboo Industry Innovation Space, creating a new atmosphere of innovation and entrepreneurship.

Today, Yong’an is working hard to become an important bamboo base, bamboo products trading center, and center of bamboo culture and tourism. It will usher in a better future for the bamboo industry.

Bamboo Instills New Life into Architecture

Mr. Wang Gang, chief architect of Urban Element (Beijing) International Architectural Design Co., Ltd.



Wang Gang is a thoughtful architect, the type of person who can always imbue his work with special connotations. To others, a bamboo pole is just a bamboo; but not to him. A bamboo can conjure up many visions in his mind: perhaps a magnificent mansion, perhaps a cottage by a stream.

For example, the Beijing International Youth Camp is a representative work of Wang Gang's many bamboo works. To his credit are such buildings as China Phoenix TV Building, Zhuhai Unicom Mansion, and Beijing Post-modern City. Of these, the Beijing International Youth Camp made a spectacular appearance in the "2014 Traveling Exhibition of Young Architects from China, Japan and South Korea."

Wang Gang is the chief architect of Urban Element (Beijing) International Architectural Design Co., Ltd. The reception hall of the Youth Camp is a small house of a little over 80 square meters.

Wang tends to see architectural design as a philosophical or attitudinal issue. He believes philosophy directly influences a man's logical thinking and his attitude to things. Different approaches to the same problem, depending on whether they are liberal or Utopian, communist or capitalist, Buddhist or Christian, will all lead to different interpretations and designs.

Wang thinks that incorporating bamboo as an important design element of the Youth Camp reception hall is an effort to transmit and spread traditional Chinese culture. China boasts abundant bamboo resources. Of the more than 1,200 varieties of bamboo in the world, close to 500 are to be found in China, giving her a dominant position in the world as far as bamboo resources are concerned.

"I heard a north European structural engineer remark that Arabs are endowed by the Creator with oil. The moment they were born they found themselves sitting on oil, so to speak. In the same vein, surely we can say that the moment we Chinese were born we found ourselves sitting on bamboo? We see it, but are not aware of

it. In life today we are drawing further and further away from the significance that bamboo has for us.” After some thought, Wang Gang elaborated, “In a Chinese dictionary there are several hundred Chinese characters with the bamboo radical, which gives a hint to its broad meaning. These words have all sprung into being for their connection with a primitive production process involving bamboo.”

“As a spiritual symbol, bamboo suggests the traits of the Chinese psyche. Its distinctively oriental nature has always been appreciated by designers at home and abroad. As people incline more and more to the regaining of natural simplicity, bamboo as an environmentally-friendly and low carbon-emission green material has become a choice material for designers, from invisible design ideas to visible architecture,” Wang put forward his view. “In modern construction technology, do we have the opportunity and the ability to present a unique style, even in an insignificant area? This is something worth pursuing by the architectural sector, something very significant and worth trying.”

As Wang Gang sees things, bamboo can manifest the value system of the built object, and a building is a public matter capable of influencing the wider society. Therefore, architects must understand their own calling from a higher and more open-minded vantage point. The priority of an architect is to create first-class living environments for the public. So it is his belief that an architect must possess moral integrity and firm conviction. Only in this way can he truly respect the environment and nature.

Recently, Wang Gang has been working on a philanthropic project — the expansion of a children’s activity center in a mountainous area in Yunnan Province. The idea is to add about 400 square meters to the original several hundred square meters for the use of ethnic minority kids. For him, the interesting things about the project are: one, the building is made of bamboo steel; two, they have dug a hole in the mountain big enough for the building to be set into it, in perfect harmony with the hill. The sloping roof of the building is designed to resemble a theater or a stadium with tiered seating, forming something of an amphitheater.

Wang stresses, “We haven’t gone after appearance or flashy features at the expense of originality, excellence and practicality. Consequently, both the local government and the users think favorably of our project, which is precisely the architectural policy we pursue.”

Wang Gang is a prolific designer and the winner of many design awards, including the Ministry of Construction’s Excellent Design Award (2005) for China Phoenix TV Building, the Asian Progressive Building Award (2006), the “Most Architectural Award” (2010) of the Beijing architectural design industry and “Best Creative Award” (2013) in the 751 Installation Expo during the Beijing Design Week.

It is surely a reflection of Wang Gang’s poetic life that he uses bamboo as a construction material so his heart can beat amid a bamboo forest!

Bamboo Industry, a Perennial Blessing to Humankind

Professor Zhang Ying, College of Biosystems Engineering and Food Science, Zhejiang University



Bamboo leaf anthoxanthin, antioxidant of bamboo leaves (AOB), phytosterol from bamboo shoot scraps, bamboo shoot ACEIP, bamboo shoot dietary fiber, *caulis bambusae flavone*, *Caulis bamusae polysaccharides*...and the list goes on. When you read such a list of ingredients of food and drugs, please remember Professor Zhang Ying and her highly productive team from the College of Biosystems Engineering and Food Science, Zhejiang University.

In 23 years of research Professor Zhang has discovered a host of bamboo extracts that can benefit health. Those bamboo extracts can be used in food, drugs, cosmetics, food additives, feed additives, biological pesticides, etc. Bamboo leaf anthoxanthin was the first element to be extracted by Professor Zhang's team. It went into industrialized production in 1998 and won the accolade of national new product of 1999. It sells under the brand of "Zhu Kangning" ("Bamboo Health").

In 2000, You Xin, a veteran expert in food science, told Professor Zhang that China's rich bamboo resources should attach itself to the food industry, turning the advantage in resources into economic benefits.

What You Xin said reminded Professor Zhang of a 1,200-year-old historical anecdote, when Feizixiao lychees were brought from the south to the Tang capital of Chang'an (present-day Xi'an). These delicious fruits rot easily and transportation was difficult, so how did they keep them fresh? Once picked the lychees were packed inside bamboo tubes, and this method kept them fresh for five or six days.

This prompted Professor Zhang to wonder what exactly it could be in the composition of bamboo that kept the lychees fresh. If there was a certain effective element, how could one extract it? It took Professor Zhang 10 years to get to the bottom of this mystery.

In the National Light Industry New Product Development Guide 2002, issued by the National Development and Reform Commission, bamboo leaf antioxidant was

included in the “Food Additive Industry Priority Development Product Summary (I).” Professor Zhang and her team embarked on research on a totally new food additive. From September 2002 through October 2003, the Zhejiang University team, together with the Zhejiang Center for Disease Control and Prevention, completed the I-IV stage of toxicological safety evaluation tests for bamboo leaf antioxidants, and then spent a further two years on application testing of these antioxidants in 10 food systems. In December 2003, bamboo leaf antioxidants passed toxicology pre-trials by the Ministry of Health’s Food Additives Standardization Collaborative Team. On December 28, bamboo leaf antioxidants were approved by the National Food Additives Standardization Committee’s 24th Annual Meeting. In February 2004, the “New Varieties of Food Additives — Antioxidants of Bamboo Leaf (AOB)” program received technical approval from the China Light Industry Federation, causing interested media to describe bamboo leaf antioxidants as a bridge between forestry and the food industry. In April 2004, bamboo leaf antioxidants were formally approved in the People’s Republic of China Food Additive Use Health Standards (GB-2760).

However, the Food Safety Law of the People’s Republic of China was enacted in 2009, and all food additives on the GB-2706 list had to comply with national food safety standards, industry standards, or Ministry of Health standards before applying for a food additive production license. The industrialization of AOB was suspended.

In 2011, the national standards for AOB as a food additive returned to the agenda. Professor Zhang’s team, together with the Inspection and Quarantine Technology Center of Xiamen Entry-exit Inspection and Quarantine Bureau, started drafting relevant standards. The “AOB National Food Safety Standards — Standards for Use as Food Additives” (GB 30615-2014) was formally issued on November 1, 2014, and was subsequently adopted as a WTO standard. With this, the industrialization of AOB could resume.

AOB is extracted, processed, and esterified from the dry leaves of *phyllostachys*. It can be used in various food systems including edible fats, meat products, seafood, puffed food, cereals, baked food, fried food, juice (pulp), and tea. In the food industry, AOB has three main uses: as a natural antioxidant, as a natural acrylamide inhibitor, and as a biological antioxidant (i.e. dietary supplement or functional foodstuff).

Products containing bamboo leaf antioxidant are green, safe, effective, multi-functional and sustainable. These products deserve further development and industrialization internationally.

As Professor Zhang says, “I firmly believe that bamboo will prove a great and everlasting blessing to humankind.”

In Search of the Functional Genes That Form Bamboo Colors



Professor Wang Juan, director of the Key Laboratory of the State Forestry Administration for the Protection and Cultivation of Rare or Endangered Forestry Plants in Yunnan Province, Yunnan Forestry Academy

She spent her youthful years investigating the invisible and intangible genes so deeply hidden within the colors of bamboo.

Her unremitting endeavors of more than two decades made her one of the first experts in China to research the functional genes of bamboo, making a great contribution. They also put her in the ranks of “Young or Middle-aged Academics and Technology Frontrunners of Yunnan Province.”

She is Wang Juan, researcher of the Yunnan Forestry Academy, director of the Key Laboratory of the State Forestry Administration for the Protection and Cultivation of Rare or Endangered Forestry Plants in Yunnan Province, and director of the Key Laboratory of Yunnan Province for the Cultivation and Utilization of Forestry Plants.

On obtaining her doctorate, Wang Juan plunged into bamboo research. Now, as well as the responsibilities mentioned above, she is also director of the China-New Zealand Joint Laboratory for the Cultivation and Utilization of Forestry Plants.

In her opinion, “Bamboo research, especially studies centered on producing new species of bamboo, must start out from the macro level and go down to the micro level so as to explore the functional genes that control the genetic attributes of bamboos.”

From 2008 through 2010, Wang Juan was at the Royal New Zealand Institute for Plant and Food Research, studying technology relating to the marking, cloning and identifying functions of the major genes regulating the anabolism of bamboo anthocyanins. On her return to China, she conducted a series of scientific studies about bamboo plants in Yunnan and used modern molecular biological techniques to make technological innovations. For more than 10 years, she has seen bamboo research as the most important part of her research field, in particular the “introduction of research technologies about the genetic engineering of bamboo’s important traits.”

In 2014, she led a project about the rapid propagation and cultivation technologies of rare and ornamental plants, a demonstration and promotion project supported by the State Forestry Administration. She put together a core team of bamboo experts to create a bamboo research and innovation platform, specializing in the large sympodial bamboos of Yunnan Province. They set up the “Yunnan Innovation Team of Bamboo and Rattan Science of the Southwest Forestry University,” a provincial sci-tech innovation team of Yunnan Province. So far, this is the only province-level innovation team in bamboo and rattan science.

Through the introduced technology, they not only introduced the bamboo pigment controlling genes, their transfer expressions and identification technologies, but also independently selected and cloned many genes linked with pigment regulation and one major gene concerning wax synthesis of the bamboo surface. They were first to acquire the important functional gene of bamboo anthocyanin synthesis, and developed a pioneer research and experimental team in this field. In the field of micro bamboo molecule biology, their research reaches national advanced level, and their cloning and function identification technologies relating to bamboo pigment and flowering genes area in a lead position.

In places like Pu'er, Wang Juan and the Bamboo and Rattan Scientific Innovation Team established 300 *mu* (200,000 hectares) of gardens of rare and special bamboos, and introduced more than 100 kinds of rare bamboo species from countries of Southwest and Southeast Asia. In Tuanjie Town, Kunming City, they established an alpine landscape bamboo garden of 25 *mu* (16,700 hectares) and introduced more than 60 kinds of alpine cold-resistant bamboos. In Manxieba Village of Pu'er, at the Asia Bamboo and Rattan Expo, they built a cultivation base of colorful *Phyllostachys iridescens*, 50 *mu* (33,000 hectares) in area.

Using technology regulating the anabolic genes of plant pigments, Wang Juan selected and cultivated new species from variants of *hispid indosasa* of *Indosasa McClure* and *fargesia fungosa* of *Fargesia*, and she successfully cloned many relevant genes regulating the anabolic genes of bamboo anthocyanins and also identified their functions. That was the first time that a series of the functional genes that can control the synthesis of anthocyanins in bamboo plants were cloned and registered; a registration number for this was acquired from the National Center for Biotechnology Information in the USA. On top of this, Wang successfully selected and nurtured two new species of *Phyllostachys iridescens*, and registered them as new garden species of Yunnan Province.

Wang Juan led and completed the “Study of Biosynthesis and Gene Regulating Mechanisms of Bamboo Anthocyanins”; three research outcomes from this have won official accreditation, as well as high praise from experts. They also introduced from Brazil certain bamboos indigenous to South America, for example the *solid-culmed Paraguayan Guadua Amplexifolia*, swamp bamboo which is resistant to wet

environments, and the savanna drought-tolerant herb bamboo. Besides, they cloned and conducted identification research on the major controlling effective genes that regulate bamboo attributes like molecular control of solid culm, rapid-growth culm, and leaf pigment.

The introductions of new bamboo species, technologies like cloning and identification of important functional genes, and efficient regulating technologies will provide China with precious new research topics and resources of knowledge for the preservation, selection and cultivation, innovation and utilization of rare new species of bambusoideae.

Three Decades in Information Services

Ms. Zhang Xinping, editor-in-chief of *World Bamboo and Rattan*,
and associate professor of RIFPI, Chinese Academy of Forestry



Since 1985, Ms. Zhang Xinping has served for more than three decades in the Research Institute of Forestry Policy and Information (RIFPI), Chinese Academy of Forestry. Thirty years ago she majored in Western languages and had scant knowledge of bamboo, but now she is an expert in bamboo information research. Her career in bamboo and rattan information research services has brought her great pleasure and satisfaction.

In 1988, Ms. Zhang served as vice director of a program of the Canadian International Development Research Center (IDRC). The program mainly covered organizing training courses in bamboo information, conducting domestic and foreign research programs, and publishing books and magazines. She was trained in bamboo policy and information at the Singapore Forestry Research Institute, Malaysian Forestry Research Institute and the Indian Forestry Research Institute. She also did a three-month research stint at the Oprins Botanical Garden Laboratory in Belgium, during which time she translated a large amount of information on bamboo cultivation in China.

In 1994, Ms. Zhang participated in the “replacing wood with bamboo” project organized by the International Tropical Timber Organization. In the implementation of this project, she and her colleagues organized a major international conference in order to promote international research and exchange of information on bamboo, and to learn successful bamboo development experience from different countries. She also co-organized a post-conference visit to the impressive bamboo forest in Anji in the south, where the great sea of bamboo was a real eye-opener for the visiting experts.

Zhu Shilin, the then deputy director of RIFPI who brought Ms. Zhang into the institute, expressed great satisfaction with her work: “Ms. Zhang’s work is a support role that she carries out quietly and efficiently, and the effects benefit a great many people.”

Ms. Zhang has been involved in the planning, editing and publishing of numerous books on bamboo and rattan, including *Chinese Bamboo Handicrafts*, *Industrial Utilization of Bamboo*, *Flora of China*, and *Replacing Forestry Wood with Bamboo*.

Flora of China is a great and far-reaching master work in 45 volumes. Ms. Zhang's task was to edit the sections on the distribution, uses, ecology and cultivation of bamboo. Between 1994 and 1999, she devoted her time to this great work, inviting experts to draft and revise entries, then engaging with the publishing house editor to go over everything, ranging from the contents of the manuscripts, the position of the illustrations, the text, and the punctuation. Her love of the bamboo can be seen in every detail. The book won a great reception and was sold out in months, necessitating a second print run. This sold well also.

Chinese Bamboo Handicrafts is the most artistic book that Ms. Zhang has co-edited. It is a book about combining the bamboo craft with everyday life. The book is a distillation of the essence of China's bamboo products, highlighting the beauty of carved bamboo roots, woven bamboo baskets, and other traditional Chinese bamboo crafts.

Ms. Zhang has written more than 10 academic papers. Her papers cover the bamboo and rattan development trends in the world, development of the bamboo industry and products in China and overseas, information search on bamboo, evaluation of the eco-environment benefits of bamboo forest, China's bamboo culture and other topics relating to bamboo. Her papers analyze advantages of the bamboo industry as a whole and summarize local bamboo development experience and leading-edge bamboo development in other countries. Those papers also explore practical bamboo production, information research on bamboo development and the connotations of bamboo in Chinese culture.

Ms. Zhang has invested most of her time and energy in bamboo and rattan publications, and the good feedback received is a source of great pride and accomplishment.

The *World Bamboo and Rattan* (formerly *Bamboo Digest*), co-edited by Ms. Zhang, is the publication that makes the greatest demands on her energy. As one of the founders, she witnessed the launch and growth of China's sole academic journal about bamboo and rattan.

In 2003, Ms. Zhang was appointed editor-in-chief of the self-financing journal. In her first days in overall charge, the greatest problem was covering the journal's running costs. Being self-financing is never a walk in the park, but Zhang is no quitter. She used every meeting and business trip to promote the journal to entrepreneurs in order to raise funds for it. It is thanks to her efforts that the journal is still in existence as a self-financing periodical.

For more than ten years, Ms. Zhang, leading her team, has explored ways to improve the quality and readability of the articles, and to get the journal more widely

known. The journal constantly tweaks its columns to meet the demands of readers and to bring them the latest information. It has added columns on patents, gardens, and the leading edge of bamboo and rattan. It reports recent advances in application of bamboo at home and abroad. Its readership includes forestry workers, bamboo researchers, practitioners of urban construction, medical workers, interior designers and others in bamboo-related fields.

Ms. Zhang constantly solicits the views of contributors and readers, and takes their demands on board. Readers approve, and as one commented, “The information in the journal is very comprehensive, up-to-the-minute, and on the academic leading edge.” She was very gratified by that compliment. In 2016, keeping abreast of new media trends, for promotion purposes the journal registered an official account on the WeChat messaging service, in order to display the achievements of bamboo applications and to spread the bamboo culture.

After years of effort by all its staff, the journal has many achievements to its credit: it is included in the main research databases in China and abroad; it has been selected every year in source journals such as the Annual Report for Chinese Academic Journals Impact Factors; and it has been rated as a Chinese authoritative academic journal by the Research Center for Chinese Science Evaluation (RCCSE).

Bamboo Entrepreneurs

Since 1980, China's bamboo industry has made a fantastic spurt. Its output value improved from RMB400 million in 1980 to RMB192.3 billion in 2015, and the product types multiplied from a few hundreds to several thousands. The private sector and entrepreneurs have played an important role in such dynamic progress and made great contributions. Today, when the Chinese government vigorously advocates public entrepreneurship and innovation, be they CEOs of leading bamboo businesses, heads of small or middle-sized bamboo businesses or managers of micro bamboo businesses, they all are forging ahead in the risky bamboo and rattan markets, working diligently and confidently.

In 2000, Chen Yongxing set up his Yongyu Bamboo Industry Development Co., Ltd. in Anji. After several years of accumulation and development, the company expanded rapidly. It initially produced only floorboard blanks but now its range encompasses over 60 series of environmentally-friendly, all-bamboo home products. Yang Qiuliang's Oulinya Garment Co., Ltd. specializes in developing bamboo fiber clothing. Within 10 years it has had more than 1,000 franchise shops, serving more than 20 million consumers and with an annual profit growth rate of 20 percent. In terms of eco-textile industry development, the brand is no longer playing catch-up. It is setting the trend. Ye Ling, chief engineer and president of Zhejiang Xinzhou Bamboo-Based Composite Technology Co., Ltd., developed bamboo winding technology and new bamboo-based composites (bamboo filament winding composites). Xu Mingjiang's Fujian Jiejietong Bamboo Furniture Science and Technology Co., Ltd. entered the group of leading bamboo furniture enterprises in merely three years. Zhou Jun, vice chairman of Chengdu Huanlong Group, set up an industrial chain covering bamboo forest bases, production of biomass pulp and base paper, finished paper processing and brand marketing in Qingshen, Meishan, Sichuan Province. His cumulative investment has exceeded RMB1 billion. Among

the owners of such big enterprises are Lin Hai, a daring international entrepreneur and chairman of Dasso Industrial Group Co., Ltd. in Zhejiang, Chen Wenzhao, chairman of Wenzhao Bamboo Charcoal Co., Ltd. in Suichang County, who turned bamboo into “black gold,” and Yu Yan, a returnee from Britain and general manager of Fujian Heqichang Bamboo Co., Ltd.

Middle and small-sized enterprises are the pillars of China’s bamboo industry. Chen Yunhua, chairman of Yunhua Zhulv Co., Ltd. in Qingshen County, Sichuan Province, weaves strips of purple bamboo to create art and wealth. Lu Jiping’s Hengda Environmental Protection Co., Ltd., currently a market leader in bamboo packing, is one of China’s 40 manufacturers of industrial bamboo mesh and similar bamboo products. As chairman of Zhejiang Jiuchuan Bamboo and Wood Co., Ltd., Zhou Songzhen is committed to developing large-scale and standardized production of bamboo furniture. Tao Zongjing, general manager of Huachang Bamboo Industry Co., Ltd. in Yong’an City, Fujian Province, made a reform in the bamboo production process and its bamboo furniture is now stocked in the world-renowned IKEA home stores. Xiong Xiaohong, chairman of Jiangxi GREEZU Bamboo Development Co., Ltd. put his mind to cultivating green “GREEZU.”

Owners of micro businesses have also made remarkable achievements. Wang Shuchun, general manager of Sichuan Lvye Landscape Co., Ltd., has been advocating his garden-building concept of “building gardens of bamboo, writing about bamboo and deriving pleasure from bamboo.” He designed the International Garden of Bamboo and Rattan for the Xi’an and Qingdao Expositions. Gao Yuan set up Hongxin Bamboo Corporation and developed his unique bamboo deep-processing chain. Du Yingzhuo, general manager of Beijing Khan Wind Technology Co., Ltd., dedicated himself to developing and producing bamboo windmill blades for the wind turbine generators. Among such entrepreneurs of micro businesses are Zhang Limin, general manager of Fujian Yong’an Minxing Sports Equipment Co., Ltd., who invented all-bamboo skateboards, Jiang Yingjun, chairman of Shuanglian Bamboo Shoots Cooperative in Yong’an, Fujian Province, Jiang Daihai, general manager of Wangtong Bamboo Shoots Co., Ltd. of Yong’an, Fujian Province, Ye Meilan, the fifth-generation owner of Fujian Yan Jiaglou Food Co., Ltd, who initiated Yong’an “all-bamboo banquet,” and Wan Xue, master weaver of Banzhu Bamboo Arts Co., Ltd. in Gaoping District, Nanchong City, Sichuan Province, who led a disadvantaged group into entrepreneurship through bamboo weaving.

Looking forward, guided by the national policy of public entrepreneurship and innovation, propelled by internet-enabled new economic development, it is certain that there will be new bamboo processing businesses, businesses that will be baptized in the waters of success and failure, opportunity and challenge, and bring new vigor to the development of China’s bamboo industry.

Bamboo Winding Composite Technology Opens Up New Ground



Mr. Ye Ling, chief engineer and president of Zhejiang Xinzhou Bamboo Winding Composite Technology Co., Ltd.

Bamboo winding composite technology and a new type of bamboo winding composites (bamboo filament winding composites) was developed by Ye Ling, chief engineer and president of Zhejiang Xinzhou Bamboo Winding Composite Technology Co., Ltd. Newly developed, bamboo winding composite technology shows great potential for development; nobody knows for sure what great role this new technology and its corresponding composites will play in promoting green development of society, yet it has drawn great attention at home and abroad.

Top-notch Bamboo Winding Composite Technology and New Bamboo Winding Composites

It took Ye Ling and his team nine years to develop the complete technical system and industrial chain of the bamboo winding composite technology and new bamboo winding composites. For the first time, the traditional bamboo industry has been pushed into the era of automation and Industry 4.0.

According to Ye Ling, the bamboo winding composite is a new type of bio-based material, one that uses bamboo as the base material and resin as adhesive, and is shaped via a winding process. The technology makes full use of bamboo's great axial tensile strength to form unstressed defect distribution in the product structure.

The bamboo winding composite is light-weight, low-cost, has great pressure resistance, outstanding thermal insulation properties and strong resistance to seismic and subsidence movement. These attributes mean it can substitute for various materials, such as steel and high-tensile plastic, for wide application in high-speed trains, aircraft frames, ships, and military equipment.

Bamboo winding composite pipe has been listed in the Second Group of National Key Low-carbon Technology Directory by the National Development and Reform Commission (NDRC). It ranked first in terms of carbon emission reduction,

achieving a cut of 64 million tons, accounting for 26.86 percent of the total 238.34 million tons of emission reductions. On January 10, 2016, administrator of the State Forestry Administration, Zhang Jianlong, declared that forestry development should “speed up the transformation and upgrading of traditional industries and strive to cultivate new strategic industries such as bamboo winding composite technology and bamboo winding composite materials.” In May 2016, the State Forestry Administration formally approved the establishment of the Engineering Research Center for Bamboo Winding Composites (ERCBWC). It was the first ever occasion that the State Forestry Administration set up an engineering research center within a private enterprise.

Opening Up a New Path with Bamboo Winding Composite Technology

Bamboo winding composite technology and new bamboo winding composites provide mankind with a good way of tackling crises in resources, environmental crisis, and climate.

China is rich in bamboo resources, the cutting capacity of bamboo amounts to 150 million tons per year, but annual consumption is just 40 million tons. Furthermore, the more they are cut, the better bamboo plants grow. The emergence of bamboo winding composite technology and bamboo winding composites enable the potential of these idle resources to be more fully deployed. Ye Ling predicts that by 2020, the output of bamboo winding composite pipe will reach 10 million tons, with an output value of RMB300 billion, nearly 1.5 times that of the bamboo industry today.

In terms of energy saving and emission reduction, bamboo winding composite pressure pipes have an obvious advantage over traditional pipes. Across the entire production process for all kinds of bamboo winding composite pipes, energy consumption per unit length (1,000 mm diameter) is much less than that for steel pipes. It is calculated that the 10 million tons of bamboo winding composite pipes produced by 2020 could replace 33.6 million tons of welded steel pipes or substitute for 45 million tons of crude steel or 72 million tons of iron ore, which would achieve a reduction in carbon dioxide emissions of 83 million tons.

The development of bamboo winding composites can greatly promote rural economic development, and help targeted poverty alleviation. To produce 10 million tons of bamboo winding composite pipes would consume 25 million tons of bamboo, to the value of some RMB20 billion. This means just by growing bamboo, the average income of five million rural households would increase by RMB4,000 per household.

Bamboo Winding Composite Technology Has Taken Off

The bamboo winding composite pressure pipe industry has burst onto the market at a remarkable speed.

In China, there is an annual demand for 100 million tons of pipes (not including cement pipe). Theoretically, the bamboo winding composite pressure pipes should be able to meet half of that demand.

According to Ye, in order to promote the industrialization of bamboo winding composites, the State Forestry Administration established the Leading Group for Development of the Bamboo Winding Composite Industry, bringing together relevant ministries and commissions such as the National Development and Reform Commission to vigorously promote the sound and rapid development of the industry.

Bamboo winding composites bring opportunities for transformation of such traditional industries as cement, real estate, and iron and steel. Following the rapidly expanding application of the new pipe, a succession of new products including bamboo utility tunnels, bamboo high-speed train carriages, and bamboo storage tanks will come to the market.

Bamboo Winding Composite Products Go Abroad

The reputation of the bamboo winding composite pressure pipe technology has traveled far and wide. It plays an important role in China's Belt and Road Initiative by exporting technology and equipment, exploiting local bamboo resources and labor force, and producing locally needed pipeline products.

Ye says they will employ a variety of ways to export technology and products. For example: technology export — the right to use technology represents 17 percent of joint venture equity; capital export — investment of 51 percent to 80 percent of the capital wins the right to set up a manufacturing holding company; equipment export — providing the manufacturing company with a complete set of bamboo and product processing lines; and exploitation of bamboo forest resources — using capital to control high-quality bamboo resources.

In December 2016, Ye Ling's company signed a cooperation agreement with INBAR. Feng Jiaping, chief engineer of the State Forestry Administration declared that "innovation in the bamboo winding composite technology will benefit INBAR member states and lead the Chinese bamboo industry to a new stage."

Currently, an ambitious masterplan is being rolled out. The projected sales target for bamboo winding composite pipe and pipe corridors is to reach RMB236.3 billion by 2020.

Babo, the First Bamboo-Fiber Household Paper, Comes of Age



Mr. Zhou Jun, vice chairman of Chengdu Vanov Industrial Fabrics Group Co., Ltd.

The new material of bamboo fiber constitutes a connection between the first industry of agriculture with the new, cutting-edge industry. The bamboo fiber industry has constructed a bridge spanning the gap between ecological benefits and economic benefits. It is a vehicle for a sustainable economic strategy.

Benefits for All from Green Bamboo Business

“I have a deep love for bamboo. The bamboo industry should be environment-friendly,” says Zhou Jun, vice chairman of Chengdu Vanov Industrial Fabrics Group Co., Ltd. He was checking the bamboo plants at the bamboo base in Qingshen County, Meishan City, together with experts from Beijing Forestry University and local bamboo farmers. The development of Vanov is helping local bamboo farmers in this mountainous area to leave poverty behind.

Vanov has invested in industrial filter materials, new bamboo fiber materials and intelligent robots. The Group has been in the bamboo industry for 10 years and has established a complete industrial chain, with its bamboo plantation base in Meishan, Sichuan Province, biomass pulping and paper processing plants and marketing operations. Vanov has invested more than RMB10 billion in the bamboo industry.

Vanov has always attached great importance to developing the bamboo industry because it benefits all concerned. Bamboo is the most popular plant in China and is an indispensable part of Chinese life. China is relatively poor in forest area and forest timber resources are less than adequate, but China is very rich in fast-growing and renewable bamboo. Currently, most of the household paper in China’s domestic market is made of wood pulp, but if just an additional one percent of people chose to use non-wood paper, it would save 200,000 tons of wood per year. That equates to an annual saving of some 10 million *mu* of natural forest. Therefore, bamboo industry is something worthy of development that will benefit generations to come.

Striving for Quality and Innovation

Zhou Jun was quick to spot the huge commercial opportunity it offered. Despite the difficulties and setbacks encountered, he and his team followed their goal in determined fashion. In fact, Vanov paid an enormous price to do so. In its first years Vanov, in common with the vast majority of paper manufacturers, produced bleached paper using traditional paper-making technology. In a move to become more environmentally friendly, it invested close to RMB1 billion to upgrade its wastewater treatment equipment. It is known as one of China's most eco-friendly manufacturers.

To produce additive-free paper, Vanov abandoned the bleaching process and spent years of effort and tens of millions RMB on bamboo fiber extraction technology. After repeated attempts, trials and failures, finally success came and the extraction process could be used in industrialized continuous production.

Vanov has independent intellectual property rights on biological pulp reduction technology in the papermaking industry, one that is quite distinct from the traditional bamboo fiber extraction process. This refining process technology extracts unbleached, dust-free and chemical-free quality bamboo fiber. Its content complies with the US FDA and EU AP requirements for materials intended to come into contact with food. This new technology is unique in the domestic and international industrial applications of new bamboo fiber materials.

In early 2015, the launch of Babo, the very first bamboo fiber household paper on the Chinese market, was a great success.

A Phenomenal Success

It only took two years for Babo to become the leading brand in the bamboo household paper market.

In 2015, Babo bamboo household paper was launched in some KA (key account) supermarket stores nationwide. The following year saw explosive sales growth, with the product displayed on the shelves of thousands of large KA stores. So popular was it that orders from all over China stacked up and there was a supply shortage for a while.

The abandoning of traditional bleaching in favor of eco-friendlier and non-polluting technology, not putting the environment under pressure, has boosted morale and pride among its thousand-plus employees and nearly a thousand retailers and partners when they sell eco-friendly paper.

The Full-dimensional Use of Bamboo Fiber

The uses of new bamboo fiber materials are not just confined to making natural household paper and other daily health care products. The production process neither involves toxic chemicals nor discharges any pollution to the environment.

The toxic-free wastes produced can be processed into humid bio-fertilizer which contains organic and inorganic nutrients, and can be used as a soil fertilizer. Grown on the land, returning post-processing to fertilize the land that nurtured it...this is a true manifestation of eco-friendliness, the life of bamboo coming full circle.

Pioneer of Bamboo Blades in Wind-Power Generation

Mr. Du Yingzhuo, general manager of Beijing Khan Wind Technology Co., Ltd.



At the Shanjinghe Wind Power Station of Zhangjiakou City, Hebei Province, stand some distinctive wind turbine generator systems (WTGS). Seen from a distance, these “giant windmills” seem quite ordinary, but they are a powerful demonstration of the green credentials of wind power energy, since the blades of these WTGS are made of bamboo.

These bamboo-made “giant windmills” were produced by a sci-tech corporation called “Khan Wind Technology.” Over the past 10 years, this company has been dedicated to research into and production of wind turbine blades made from bamboo. It is hard to believe that this little-known and modest company, without great fanfare, is promoting the rapid development of high-end bamboo manufacturing industry.

Natural Fibrous Blade: from Wood to Bamboo

Bamboo is not the first kind of natural fiber used to make blades for wind turbine generators. As early as in the 1980s, some manufacturers in Britain began producing wooden blades. More than 10,000 wooden blades have been made by Vestas, 80 percent of them 40 meters long or even longer.

In 2005, Du Yingzhuo and his group began looking into the potential of bamboo blades. With the support of the Chinese Academy of Forestry and the guidance of bamboo experts such as Yu Wenji and Wang Ge, they reorganized and upgraded the technologies of scrimber, and produced blades from bamboo composite.

The choice of composite material over whole bamboo, Du Yingzhuo explains, was because whole bamboo does not have the strength to meet the high requirements of WTGS. By integrating different materials to achieve synergistic effects, composites perform better than natural materials, and can meet various requirements and demands. According to him, the bamboo content of each blade is more than 50 percent.

Today, Khan Wind Technology has obtained a number of patents relating to bamboo-based wind turbine blades, and has been cooperating with other Chinese companies to promote their widespread use. Up to now, it is the only Chinese wind power enterprise to invest in Iran, and its Iran factory has an order book worth several hundred million yuan.

Du Yingzhuo believes that innovations in blade material, from fiber reinforced plastics via wood and on to today's bamboos, undoubtedly make the material properties more stable, more cost-effective and more suited to global green and low-carbon trends.

Better Green Credentials for New Energy

Bamboo composite blades are recyclable, biodegradable and environmentally friendly. Apart from these obvious advantages, in what other aspects are they superior to other types of blade?

Experts tell us that the C/P ratio of electricity generator blades depends on the length of the blades and their production cost. Choosing bamboos in place of FRP as the main structural material can make the blades lighter and cheaper. The greater the length of the blade, the better its generating capacity. Lighter blades can not only reduce the price of the blades but are also helpful in optimizing the overall design of the generator system by reducing the load requirements of the transmission chain.

According to Du Zhuoying, Chinese bamboos enjoy many advantages, such as better mechanical properties, short growth cycle, abundant supply and low cost. Bamboo blades are simple to process, cheap in cost, stable in performance and recyclable. Furthermore, they can be designed and used for any specification.

Today, high performance, low cost and recyclable bamboo-composite blades have become part of the beautiful scenery of the wind power industry.

Bamboo Use and Intelligent Industrialization

A graduate of Tsinghua University with further studies at Harvard University, Du Yingzhuo majored not in forestry or bamboo industry but in industrial manufacture. He brought this industrial perspective to the rediscovery and redefinition of bamboo. He believes that China's rich bamboo resources are a precious gift from nature, and processing them in simple and primitive fashion is a terrible waste of this gift.

Du Yingzhuo and his team are assiduously studying applications of bamboo in other industries. They have worked together with the Baidu Group, Foxconn Technology Group and others to research and develop smart chopsticks that can detect oil quality. The net weight of bamboo in each pair of smart chopsticks is just 6 grams, but it realizes the high-tech and high value-added utilization of bamboo. This new product won a number of international design prizes before being launched officially.

The successful research and development of smart chopsticks has put wind beneath Mr. Du's sails. Since bamboo can look perfect in wind power blades longer than 40 meters and in smart chopsticks weighing only 6 grams, is there anything that can't be achieved with bamboo?

Since bamboo fiber is more responsive to wireless signals than other materials, Du believes that bamboo can play a big role in the future, as smart domestic devices and smart equipment become more prevalent, and can also lead the trend of intelligent use of natural materials in the field of industrial manufacture. Now, Du Yingzhuo's team is researching and testing bamboo-made brackets in photovoltaic power generation, yachts, auto parts, etc.

Du Yingzhuo is confident about the future of bamboo applications, and declares: "We believe we are on the cusp of a new era, an era of industrialized bamboo changing how we live."

Bamboo Keyboard Innovation

Mr. Feng Xuquan, general manager of Jiangxi Tonggu Jiangqiao Bamboo & Wood Co., Ltd.



How many uses can a bamboo be put to? Since time immemorial, bamboo served just two purposes: the stem was used to make utensils and the shoots were used for food. However, in today's fast-changing sci-tech times, "bamboo + sci-tech" seems set to create an entirely new world. While many were still dubious about this possibility, Feng Xuquan was already a step ahead. Armed with science, he has tackled the difficulties of bamboo, trying everything, from making bamboo floorboards to making bamboo keyboards.

Replacing Plastic with Bamboo

The world's first all-bamboo, environment-friendly, technology-based computer keyboard came into being on April 1, 2009. As endorsed by Zhang Qisheng of the Chinese Academy of Engineering and other four influential experts, the technologies involved in the bamboo keyboard are reasonable and practicable, and reach internationally advanced level.

The new keyboard ended the total domination of the plastic keyboard, set a precedent for bamboo replacing plastic in keyboard manufacture, and kicked off a new trend in the bamboo deep-processing industry. Further application in electronics followed: bamboo computer mice and bamboo flash drives, are just two examples. There was one man behind the scenes pushing this movement. That man was Feng Xuqing.

Feng, born in 1970, and a bamboo industry "old-timer," has a colorful resumé, having worked as electrician, mechanic, and self-employed businessman, and then in the fields of timber and bamboo sales, catering and bamboo flooring sales. Currently he is general manager of Jiangxi Tonggu Jiangqiao Bamboo & Wood Co., Ltd., and concurrently vice president of Jiangxi Provincial Bamboo Industry Association. The bamboo electronic products developed by him have several advantages over

traditional plastic ones by virtue of their low cost, low percussive noise, anti-static properties, natural temperature, green and healthy properties and recyclability.

To date, his company has been granted seven national invention patents, 18 utility model patents, 13 design patents and 2 international patents. It has fixed assets of RMB150 million and a bamboo base of 50,000 *mu* (3,333.3 hectares). It brings benefits to 6,000 people, giving them an annual per capita income of RMB1,000 and more.

In 2014, the company produced 1.5 million sets of bamboo computer keyboards and mice, 200,000 square meters of bamboo floorboards, and outer casings for mobile phones, loudspeaker boxes and computer display screens. Bamboo keyboards and other products achieved sales income in excess of RMB190 million, profits taxes of over RMB20 million and export earnings of US\$25 million.

Feng's series of all-bamboo products have earned him numerous honors, among which are: Jiangxi Provincial Independent Innovation Product Award, Jiangxi Provincial Outstanding New Sci-tech Product Award, China Yiwu International Forest Fair Product Gold Award, Sixth China Bamboo Culture Festival Product Gold Award, National Forestry Fair Gold Award, Product Innovation Gold Award for National Leisure & Agricultural Quality Product Innovation Competition, and Jiangxi Provincial Science and Technology Progress Award.

Such success was no overnight achievement. It took Feng four years of trying before the bamboo keyboard was finally born.

The Vast Potential for Bamboo Products

The people of Tonggu County are particularly able to “think out of the box,” and they have made two revolutions in full utilization of bamboo resources. Tonggu is the birthplace of two Chinese firsts: bamboo floorboards and bamboo keyboards.

In 1998, positive about the market and the prospects for bamboo floorboards, Feng chose to deal in “Jiangqiao” brand bamboo floorboards and broke all previous sales records. However, in 2005, profits on these products fell dramatically and Feng was compelled to think about the future direction of his company.

One day, mind wandering and tapping at random on his computer keyboard, a bright idea came to him out of the blue... There would surely be a market for a low-carbon, environment-friendly and energy-saving bamboo keyboard! Right away, Feng set up a team to focus on bamboo keyboards. They would make a keyboard, take it apart, make it again, and so on. Four years of countless attempts and sleepless nights later, they finally succeeded!

The success brought the enterprise hope but it was no easy job to take the invention into production. In July 2009, Feng established Jiangxi Benbu Technology Development Co., Ltd. By the end of April, 2010, its standardized production lines were completed, outputting 3,000 bamboo keyboards daily. At various exhibitions

since then, its all-bamboo keyboards, half-bamboo-half-plastic keyboards, bamboo computer mice and bamboo flash drives have proven popular with Chinese and foreign buyers alike.

As a result of this runaway success, the cost of one bamboo rose from RMB18 to RMB21. Assuming sales of 4.8 million bamboo keyboards and computer mice, bamboo farmers would get an additional income of RMB3.6 million.

Feng's company has made a remarkable journey — from producing bamboo floorboards to bamboo computer keyboards, from China-made to China-invented products, from getting cheap processing fees to reaping high added value. Feng's freeing up the bottleneck in bamboo deep-processing has caused added value to multiply more than 30-fold, and has given the industry wings to fly.

From Designing Ships to Designing Bamboo Crafts

Mr. Zeng Weiren, international master of arts and crafts, master of traditional Chinese crafts, and senior landscape designer



Zeng Weiren is from Anji in Zhejiang Province, a beautiful land of bamboo. He graduated in ship design but ended up creating things of beauty with bamboo. So what chance of fate was it that set him on this road, with bamboo as his companion?

Playing Bamboo Musical Instruments with Emotion

Zeng Weiren majored in ship design at university and worked at a shipyard after graduation, designing and building ships for several years. But the bamboo forest scenery of his hometown was never far from his mind. He opted to return to the artistic scene, going in for interior design. At first, he was chief designer in a decoration company subordinated to a government department. But he felt too far away from his beloved bamboo, so he quit the job and set up his own studio: all he wanted was to be involved in bamboo-related design.

Zeng Weiren really loves to design and make musical instruments from bamboo. In April 2001, he designed and created a whole set of musical instruments for Anji Cultural Center. At the time it was the largest bamboo instrument group, played by 22 musicians on the same stage. They conjured up the sounds of nature, indistinguishable from the real thing; the chirrups and songs of insects and birds, the sounds of wind and the pattering of rain, the babbling of streams...

Various kinds of bamboo instruments created by him are set in his Jiangnan Bamboo Design Studio, alongside farm household utensils such as strainers for airing fruits and vegetables, a winnow for separating grains from chaff and a stuffed buns steamer. "When people see these instruments for the first time, they are truly amazed."

Recreating the Beauty of Bamboo from the Heart

Zeng Weiren's path to popularizing bamboo landscape design was initially a difficult

one, full of setbacks. But he held fast to his bamboo dream and inched toward success.

In August 1998, a big hotel opened in Anji with bamboo as its prominent feature. Crystal-clear water patters from bamboo tubes; bamboo poles form enclosures; walls of bamboo strips form a beautiful picture, enhanced with woven bamboo baskets and vases; guests sit on bamboo swings eating. This is one of Zeng Weiren's most notable bamboo interior works.

But when he first proposed the idea, all the reactions were negative. The boss was very dubious about the design concept and disapproved the bamboo design. Zeng Weiren talked to him again and again and finally persuaded him. Once the hotel opened, it was very popular.

In September 2008, preparations were being made for Bamboo Culture Festival to be held in Shanghai's Guyi Garden. The official in charge paid Zeng Weiren a visit and asked him to design a bamboo phoenix to be placed in the center of the park. Zeng plunged into the bamboo forests for a few days and, on returning to his studio, began drawing immediately. Soon, a bamboo phoenix emerged, lifelike, on the paper. When this bamboo phoenix, 8 meters high, 16 meters long, and 6 meters wide, made its spectacular debut, it was met with enthusiastic applause and cheers.

In 2014, he designed a bamboo corridor, some 4,000 square meters in area, for the wetland park of the ancient Dian Kingdom in Kunming. The client marveled at Zeng Weiren's work, describing him as a rare craftsman in the design of bamboo landscapes and structures.

Creating Bamboo Landscape with Great Efforts

Those who know Zeng Weiren well know that it is the vigorous bamboo forest that fills him with boundless creative vigor and vitality.

In August 2000, Zeng Weiren collaborated with others in designing the China Bamboo Museum in Anji's China Bamboo Expo Park. He also designed and constructed the thematic bamboo building in the park; in March 2003, he cooperated with the China Academy of Art in completing "Pure Bamboo Language" furniture made of unprocessed bamboo. A combination of Ming Dynasty style and modern style, it won an Award of Excellence in the National Exhibition of Fine Arts. In October 2006, "Bamboo House on the Water, Zhenjiang, Jiangsu" that he designed and built won the Best Individual Style Award and Design Style Award at the China International Architecture Biennale organized by the Ministry of Construction and Ministry of Culture.

In April 2007, he designed and built a bamboo architectural complex in Purple Bamboo Park, a relaxation project associated with the Beijing Olympic Games. In June 2009, he made Shanghai World Expo mascots out of bamboo for Anji; in June 2010, he designed and made large-scale bamboo frogs, butterflies and Chinese knots

in Shanghai's Bamboo Lotus Arts Festival; in June 2013, he designed and built the bamboo and rattan plank road, bamboo umbrella pavilion and bamboo entrance for the INBAR (International Network for Bamboo and Rattan) international garden at the 2014 Qingdao International Horticultural Exposition; in November 2016, he designed and built a super-long-span bamboo structure carpark in Yuhang, Hangzhou.

Using his Love to Popularize Bamboo Technology

“Getting foreigners to fall in love with Chinese bamboo.” This was something Zeng Weiren used to dream of. And indeed, he did come to export Anji's bamboo planting and processing technology abroad.

In March 2009, two technicians in his studio were recruited as experts in China's foreign aid to Rwanda. They were responsible for bamboo planting, processing and utilization. Zeng Weiren gave them systematic training before their departure, and he helped the Bamboo Research and Development Center of the State Forestry Administration formulate theoretical teaching material and prepare educational equipment for Rwanda.

In April 2015, a Memorandum of Understanding was signed with Sarawak, Malaysia, for bamboo business cooperation, which would promote development of the bamboo industry in Malaysia.

Zeng Weiren's superb skills were taken abroad by the two experts. Along with technology for the training of key technical staff for the bamboo industry, they brought friendship with them too.

Bamboo Packing Proves Its Worth in Industrial Cooling

Mr. Lu Jiping, general manager of Hengda Environmental Protection Co., Ltd.



In hot summers, air conditioning is a necessity in many places. However, few people know that bamboo is now used as a key refrigeration material in AC cooling systems. This is an important breakthrough in the field of bamboo processing as well as a revolution in refrigeration material.

Hengda Bamboo Packing Co., Ltd., headed by Lu Jiping, is located in Yixing, a waterside city in southern China. It is a market leader focused on using bamboo packing in high-temperature industrial cooling processes.

Lu Jiping, the company's general manager, did not start his career as a bamboo expert, but as a construction engineer solving problems encountered by clients using industrial electric power.

Once, a steel company boss asked him the following question: in the steel-making process, ordinary fiberglass and concrete cannot withstand the high-temperature vapor in the cooling tower. In this cooling process, vapor of 900°C (1652°F) flows into a series of grids until it cools down to 30°C (86°F) before being returned to the production process. What kind of material can withstand such a high-temperature environment?

Ten years ago, Hengda's R&D team and Nanjing Forestry University began a joint exploration of the pressure and temperature resistance of a variety of materials. Concrete, engineering plastics, and steel-based composites were used as packing in cooling towers, and a series of tests was conducted to find material with greater durability and heat resistance.

Trying out bamboo as cooling tower packing was considered "a fantasy" at the time. Since it had never previously been used in engineering and industry, engineering designers were naturally more inclined toward to high-tech and new composite materials.

However, in major bamboo producing countries such as China, bamboo is already widely used, from simple handicrafts to high-quality flooring, high-end furniture

and even in some structural building design. Although bamboo has material properties that make it ideal for application in high-value industries and engineering, its applications in new areas of industrial engineering are not widely known; for example, bamboo-reinforced composite pipes, and bamboo packing. The use of bamboo as cooling packing would greatly enhance its added value and broaden its scope of application. Based on the preliminary results of the bamboo tests, the R&D team further found that bamboo outperforms plastics in extreme high-temperature environments.

According to Lu Jiping, load measurements have demonstrated that bamboo packing can last 15 years in transforming 900°C vapor into water; this is three times the life expectancy of PVC fill, and it is, moreover, completely biodegradable. Plastic fill has to be replaced every three or five years in cooling towers in extremely high temperature power plants and production facilities, but the properties of bamboo guarantee 15 years of useful life, not to mention having excellent resistance to temperature change. For instance, when used in projects in China's cold northeast, it can withstand winter temperatures as low as -40°C.

Lu admits that currently it costs power plants 30 percent more to use bamboo packing than plastic fill, but the former has a longer life and better environmental performance in that it ultimately winds up as organic waste or fertilizer and ends its product life cycle by rejoining the ecosystem, whereas PVC material is not biodegradable. But the problem of cost does not worry Lu because he believes that with scientific and technological advance and the expansion of industrialization, the cost of bamboo packing is set to fall.

Bamboo's fast growth rate means it quickly becomes usable, providing a steady stream of raw material for cooling towers. Hengda sources its bamboo raw material from Hengda Eco Parkin Zhangzhu Town, Yixing. By signing long-term supply contracts with the local bamboo growers, Hengda has expanded sales avenues for these farmers and greatly raised their incomes.

Lu believes there to be huge potential for bamboo packing in the global market. In China alone, a single 300MW generator set needs 6,600 cubic meters of bamboo cooling packing. He believes that more industries throughout China will be interested in this innovative use of bamboo and in this way will popularize the green benefits of these bamboo products. Bamboo cooling packing is applicable in industries such as electric power, textiles, chemicals, paper-making, and textile printing and dyeing. Its non-distorting and non-corroding properties mean it has even more potential as a material in engineering and industry.

Hengda is currently the market leader in bamboo packing and one of China's 40 manufacturers of industrial bamboo grids and similar bamboo products. Lu and Hengda will continue to expand the huge market for bamboo packing with other enterprises in the industry.

Committed to Mass Standardized Production of Bamboo Furniture



Mr. Zhou Songzhen, chairman of Zhejiang Jiuchuan
Bamboo and Wood Co., Ltd.

Zhou Songzhen is the board chairman of Zhejiang Jiuchuan Bamboo and Wood Co., Ltd., located in Qingyuan County, Zhejiang Province, where fresh bamboos are transformed through design and manufacture into chopping boards, chopsticks, chairs, bookcases, lampshades and even computer mice... Chairman Zhou is committed to large-scale and standardized production of bamboo furniture, striving to make China's traditional bamboo culture prosper.

The Establishment of Jiuchuan

Zhou grew up in Qingyuan County, dubbed a "Chinese homeland of bamboo" for its rich bamboo resources. Bamboo is the traditional key industry here.

April 17th, 2007 is unforgettable to Zhou Songzhen since this was the day he started out on a brand new career path in the bamboo industry and set up the now well-known Jiuchuan. For nearly 20 years previously he had run a profitable business cultivating edible fungus. What made him quit this and start out on an uncertain future? It was his dream of turning the abundant bamboo resources of Qingyuan County into wealth.

Zhou was aware that no single product can embody all of bamboo's virtues, and that the key to developing the bamboo industry lay in exploiting every aspect of bamboo resources. Therefore, he made it his top priority to develop new products and improve product quality. He invested great sums into product development and produced a variety of bamboo products including small and large furniture and craft items, opening up the market and ushering in a golden age.

Under his leadership, his team developed and patented "dust-removing, explosion-proof and recycling equipment" technology which helped enterprises by solving the dust removal problem, simultaneously saving energy and reducing emissions. He introduced the automatic electrostatic spraying device to improve efficiency... Once

the company had achieved transformation and upgrading it started to create its own brands, attracting many customers and doubling output value year on year. Its breakneck growth rate attracted the attention of its counterparts.

Successful Online Sales

Chairman Zhou is not a man whose head is easily turned by success. He turned his sights on the on-line market, using the internet platform to boost sales.

“Internet use had become increasingly commonplace. Online shopping was the first choice for many people and buying bamboo goods on-line was becoming a new trend and I wasn’t going to miss out on the opportunity to get bamboo products into every home,” Zhou explained. He set up a new branch, the e-commerce department, to handle on-line business.

Unfortunately, lack of experience meant the initial foray into on-line trading failed, despite a valiant effort. How to take the advantage of the Internet? Zhou racked his brains in search of an answer; how could this setback be overcome?

Early in 2012, he created the “local warehouse shipping service” model, and this successfully attracted on-line retailers. Once an order is created, the on-line trader forwards the order message to Jiuchuan for fulfillment by its local warehouse, a system that cut transportation distances and delivery waiting times. Consequently, more on-line retailers took on their products and there was a conspicuous increase in sales.

It was a smart move by Zhou to set up the e-commerce channel. Thirty percent of the company’s output value now comes from on-line sales. Now, the enterprise has an output value of RMB1 billion, ten times more than in pre-e-commerce days. Thanks to the efficient “local warehouse shipping service” model, the number of on-line retailers multiplied rapidly. In 2015, its sales revenue increased by 16.89 percent over 2014. Since 2016, sales to date have increased by 20 percent over the previous year.

Holding Fast to the Bamboo Dream

How to achieve better development of the bamboo industry? This is a question that has long preoccupied Zhou, and in recent years his thoughts have turned to vertical integration of the industry, uniting bamboo cultivation, manufacturing and services.

Local bamboo growers can raise chickens and bamboo fungus among the bamboos, improving the productive exploitation of the bamboo forests. The opening up of pick-your-own areas, where visitors can dig out bamboo shoots and gather bamboo fungus, could attract more tourists. Process industries could be part of the tourist trail, with a shop in front and a factory behind. There tourists could learn more about bamboo through hands-on creation of some simple bamboo products. They could offer a one-stop tourism service, operating farmhouse restaurants, inns and tourist attractions, offering easy access to a taste of rural life.

“We must take full advantage of bamboo culture and develop tourism in order to promote manufacturers and their products,” declares Zhou Songzhen. In 2015, their 3,000 sq m product display center was refashioned as a visitor shopping center displaying more than 800 different bamboo products. Most popular purchases are the newly developed ornaments, charms, mobile phone stands and Zen crafts. The opening day attracted hordes of shoppers, who packed their cars with a variety of Jiuchuan bamboo products. The shopping center has become a must-visit tourist destination.

“I will never give up my dream. My dream of turning bamboo into gold. My dream of using the bamboo resources of Qingyuan County to help its people into affluence.” Zhou is a man who faces the future with confidence.

Using Bamboo to Weave Art and Wealth

Mr. Chen Yunhua, inheritor of national intangible cultural heritage, a Sichuan master of bamboo weaving, Qingshen Yunhua Bamboo Tourism and Culture Co., Ltd.



Before his sixth birthday he was already making articles from bamboo strips, and by the time he was 21, he had opened the first bamboo weaving workshop in Qingshen County; during his 40 years of bamboo weaving he has made over one thousand craft items, combining bamboo weaving skills with industrial development; from making craft arts he switched to founding China Bamboo Town and the Bamboo Weaving Museum, his dream and vision being to develop an all-round industry combining “bamboo weaving, culture and tourism.” This man is Chen Yunhua, inheritor of national intangible cultural heritage, and a Sichuan master of bamboo weaving.

From Street Craftsmen to Industrialized Development

Chen’s career as a bamboo craftsman started off in his own village. He was born in 1947 to a poverty-stricken peasant family, in Qingshen County, Sichuan Province. By the age of 15, he was well known in the village as a “handy guy,” supporting his family by weaving bamboo. In 1968, along with some villagers, Chen started the first bamboo weaving workshop in Qingshen County. This provided a fixed place of work for craftsmen in the vicinity and was the origin of the county’s bamboo industry.

Over the past four decades, Chen and his team have made more than 1,000 beautiful bamboo handicrafts, among them painting and calligraphy, packaging, furniture, farm tools and cooking utensil. They won over 20 patents, four of them for inventions.

Propelled by Chen Yunhua, bamboo weaving in Qingshen has evolved from a livelihood of street craftsmen into a green industry of limitless potential.

From Single Product to Cross-sector Expansion

During the Chinese New Year in 1988, the idea of weaving the *Picture of 100 Chinese Emperors* happened to come into Chen’s mind. It took several months of hard and

creative work to produce the art work, which is 90 cm in length and 26 cm in width. Connoisseurs praised it in the highest terms, as a classic bamboo handicraft of peerless workmanship.

In 1991, Chen and his team were invited, as representatives of Sichuan folk arts, to give demonstrations in Hong Kong, Macao and Taiwan. During one of these, the *Picture of 100 Chinese Emperors* was bought by an American businessman at the price of US\$48,000. This sizable income inspired Chen to bigger dreams — to make Chinese bamboo weaving culture go global, and use bamboo weaving art to help the world understand China. He decided to build an exhibition town in the land where he grew up; it would bring bamboo weaving art and tourism under one roof.

The birth and success of China Bamboo Town confirmed Chen's thinking. If it relies exclusively on production and sales, bamboo weaving art will not last; its life expectancy could be short. Only by combing culture and tourism, and using them as support for bamboo weaving art, could bamboo weaving develop faster and better. Following this idea, Chen decided to establish a museum of bamboo weaving. He said, "I will build a landmark museum, and make it symbol of bamboo weaving in Qingshen."

The museum's establishment in October 2008 has given the bamboo weaving industry a broader space for development, attracting a large number of tourists to visit and shop, and helping Qingshen bamboo weaving to march towards a bigger stage.

From Local Hero to Overseas Fame

Chen hopes that the bamboo weaving industry can lead more people out of poverty and toward wealth. In 1984, he organized the first bamboo weaving training course in Nancheng Township, Qingshen County. This was the first but not the last step in providing technical training in his craft. Over the past 30 years, he has run more than 500 training courses and trained tens of thousands of people. In Qingshen County alone, more than 30,000 farmers have become rich through bamboo weaving; average annual income in the region now ranges from RMB30,000 to more than RMB200,000.

One of Chen Yunhua's earliest students in Qingshen was He Guomin, from Gaofeng Village, Yongshou Town. Today, he is a famous specialist in bamboo lantern making, with an annual net income exceeding RMB200,000. He often says, "Had it not been for Master Chen's guidance, I'd still be living in poverty."

In 2000, the INBAR designated China Bamboo Town as an official training base of bamboo crafts. Over the following 14 years, Chen Yunhua and his team gave bamboo weaving training sessions in more than 40 countries and regions on all five continents. An agricultural expert from the EU wrote an inscription for him, "With people like Chen Yunhua, China can make progress." The vice-minister of the

Vietnamese Ministry of Agriculture said, “We think very highly of Master Chen’s talent, and he has contributed invaluable cultural heritage to humanity.”

The Ninth China Bamboo Culture Festival was held in Chen’s hometown in October 2016. Four ambassadors and over 20 diplomats from 20 member states of the INBAR in Africa, Asia and Latin America visited Chen’s bamboo museum. More than 10 students from Ghana who had been studying bamboo weaving for about a month showed their works to visitors. Chen was overjoyed.

From the *Picture of 100 Chinese Emperors* to the birth and establishment of China Bamboo Town and Bamboo Weaving Museum, from Sichuan Province’s plan of building a world bamboo weaving art city to bamboo farmers getting rich because of the industry...step by step, led by Chen Yunhua, bamboo weaving has become a leading industry of Qingshen County and Sichuan Province. And, as we speak, it is going out into the wider world.

International Success for a Daring Entrepreneur

Mr. Lin Hai, chairman of Dasso Industrial Group Co., Ltd. in Zhejiang



In 2003, the designers of the new terminal building at Madrid International Airport wanted it to have a roof of environment-friendly bamboo. The 230,000 sq m project was the world's biggest deal for bamboo that year.

In order to meet airport requirements, bamboo materials must achieve a M1 fire rating, the highest level of fire safety. To achieve M1, the bamboo sheet must be fire-proof when a 1,400-degree centigrade blow torch is directed at it from a distance of 4 centimeters. When the flame is removed, the sheet must self-extinguish totally. The designers wanted the bamboo samples within six months.

In order to tender for that project, Lin Hai, chairman of Dasso Industrial Group Co., Ltd. took the risk of investing US\$200,000 in testing suitable bamboo material. After more than 50 failed trials, success came at last!

Samples were sent from China to Spain for testing and approval. After intensive testing, Lin signed the contract for Madrid International Airport's fire-resistant ceiling project. That order was worth RMB60 million, and it won the company a good reputation at home and abroad.

An Energetic Promoter of Bamboo Applications

Lin Hai first became aware of the concept of "industrialized application of bamboo" from a book by Zhang Qisheng, an academician of the Chinese Academy of Engineering, who advocated that China's age-old tradition of handicraft workshops and production of bamboo items should be upgraded to more modern production methods. In Lin's view, this was a major conceptual breakthrough for the bamboo industry.

Under Lin's leadership, Dasso aims to "provide high-quality, sustainable green bamboo products for the whole world," and strives to be a "global promoter of bamboo applications."

With this concept in mind, Lin led his team to study a wider range of bamboo applications. Lin considers bamboo to have unique mechanical properties, and the team's research effort was directed toward developing those mechanical properties in wider areas of application.

The 10-year period between 2006 and 2015 produced bumper harvests. Led by Lin Hai, the team successfully developed fire-proof, flame-resistant bamboo material and high-strength wind turbine blades. Their research overcame the durability problem of chemical preservative-free bamboo in outdoor use.

Lin's team also developed bamboo acoustic materials for large drama and music venues. In 2012, Dasso supplied bamboo acoustic materials for the largest industrial bamboo project in China — the Wuxi Grand Theater. Dasso also supplied high degradation-resistant outdoor bamboo products for Shandong Provincial Grand Theater, the World Youth Olympic Games and other outdoor projects. Dasso made anti-static bamboo flooring for the Great Wall Motor Engine Factory. Their bamboo materials have also been used for car interiors, in BMW, Mercedes-Benz and Lexus vehicles for example.

As the reputation of Dasso and its chairman grew, so too did its research prowess. Dasso participated in a program of "Production and Application Technology of Sliced Bamboo Fineline Veneer" which was later awarded second prize in the 2007 National Award for Technological Invention. Another program in which Dasso participated, "Key Manufacturing and Application Technology of High-performance Bamboo-based Fiber Composites," won second prize in the 2014 National Award for Technological Invention. In 2014, Lin Hai received a China Forest Industry Lifetime Achievement Award from the China National Forest Products Industry Association.

Selling His House to Fund His Bamboo Venture

Twenty-five years earlier, Lin was deputy director of Qingyuan County Forestry Bureau in Zhejiang Province. He was in charge of the county's forestry workers, dealing on a daily basis with felling, transporting timber and making wood panels. He believed that, given China's shortage of timber, bamboo was being under-exploited as the "second forest resource." He sensed a precious development opportunity.

At that time, reform and opening up had started, and the government was encouraging officials to start their own businesses. Lin, along with several colleagues, gave up their steady jobs and plunged into entrepreneurship. He happened to see a machine-made bamboo sleeping mat, something usually made by hand. Drawn to this, he decided to follow it through. No longer a government official, he turned his focus from wood to bamboo. Without a cent of capital to start the business, he reluctantly sold his house in his hometown to finance it, and so started out on his bamboo manufacturing career.

In 1993, Lin Hai founded Zhejiang Dasso Flooring Co., Ltd. In the first two years, Lin and his band of brothers worked their fingers to the bone: there was no room for failure. Having successfully produced the first batch of bamboo flooring without a quality standard, their excitement was short-lived. Who were the customers and where was the market? Without these, the products would not sell and there would be no return on capital. Without a change of direction, the company faced going broke.

In order to survive, Dasso chose to produce wooden flooring rather than bamboo. Although the company made money from this product, Lin never forgot his original intention and, after two years, he plunged once more into research on bamboo floorboard manufacture. After studying market requirements, Dasso formulated China's first set of standards for bamboo floorboard manufacture. Under Lin's leadership, the obscure little factory built from nothing overcame difficulty after difficulty to become what it is today — a leading sci-tech innovating enterprise of the national bamboo industry.

Today Dasso is a group enterprise that keeps on expanding. Its chairman Lin Hai is also a member of the National Bamboo and Rattan Standardization Committee and vice chairman of the Processing and Utilization Committee of China Bamboo Industry Association. He has made conspicuous achievements in developing the bamboo industry. In his words, "I have given my youth and my time to bamboo."

From Bamboo Flooring to Bamboo Home Furnishing

Mr. Chen Yongxing, chairman of Zhejiang Yoyu Bamboo Joint-Stock Co., Ltd.



The output value of the bamboo industry in Zhejiang's Anji County accounts for 20 percent of China's total. There is a local entrepreneur there whose name is legend. Local people call him "bamboo addict" and he calls himself "the hired hand of bamboo." This man is Chen Yongxing, chairman of Zhejiang Yoyu Bamboo Joint-Stock Co., Ltd.

First Lay the Foundations, Then Start the Business

Chen Yongxing graduated senior high school but his formal education stopped there. However, that relatively low level of education in no way dulled his commercial instincts. He started his own business in his twenties, and founded several bamboo product manufacturing enterprises. Development was red-hot.

In 1999, after starting a second enterprise in Fujian, Chen returned to his hometown of Anji. In his opinion, only with his feet on native soil could his business make solid headway.

Chen spent the second half of 1999 doing a comprehensive and thorough investigation on the bamboo industry in Anji. He saw the vast swathes of bamboo forest there as offering great potential for the sustainable development of the bamboo industry. Therefore, he decided to go into the then emerging business of bamboo flooring. In 2000, he established the Yoyu Bamboo Industry Development Co., Ltd. to produce bamboo flooring boards. Chen was a pioneer in the field of bamboo flooring, but he saw it as just the beginning, not the realization of a dream.

Chen believes that, although bamboo is a renewable resource, resource-consuming enterprises must think ahead and decide in advance on strategic distribution. Accordingly, he began drawing a distribution plan of bamboo resources. In 2006, he started setting up a series of bamboo bases and processing enterprises in Anhui, Fujian, Jiangxi, Yunnan and Hunan provinces. Even in those days when

bamboo flooring was in its infancy, the idea and actions of establishing his own raw material bases had the future in mind. With the establishment of a bamboo base in Myanmar in 2014, Chen extended his bamboo resource network overseas.

The expansion of its raw material forest base has enabled Yoyu Bamboo Joint-Stock Co., Ltd. to keep improving its overall strength. Its business scope has been expanded from flooring to home furnishings, and now encompasses over 60 all-bamboo, environment-friendly products.

Opportunities Come for the Prepared Mind

Opportunities come for the prepared mind. It was Chen's years of hard work and persistence that allowed him to grasp his chances when they came along.

After China's accession to the World Trade Organization in 2002, Chen concentrated his efforts on overseas market expansion. Its environment-friendly and renewable origins made bamboo flooring attractive to European customers, so it took only a few years for Chinese bamboo flooring products to become popular in Europe and the United States. Yoyu was a prime example.

The 2008 Olympic Games in Beijing had a "Green Olympics" theme, so the quick-thinking Chen seized the Olympic business opportunity. Targeting the construction needs of the Olympic venues in Beijing, his company developed the mosaic floor. With high abrasion resistance and high technology content, this green product was selected by the organizing committee. As well as being used in sporting venues, it was the only designated product for the Beijing Olympics National Convention Center.

The 2010 Shanghai Expo was another occasion where Chen Yongxing promoted his bamboo flooring. During the Beijing Olympics, Chen's team was already working on the development of outdoor flooring. They found that physically modified bamboo could prevent corrosion and resist high temperatures. In order to promote outdoor bamboo flooring, Chen invested over RMB3 million in foreign equipment and took the product to Canada for testing by authoritative organizations. Finally, Yoyu Outdoor Bamboo Flooring became the designated flooring for open-air venues at the Shanghai Expo.

A highly visible presence on major international platforms is not just an endorsement of Yongyu's innovation- and quality-oriented philosophy; it has also boosted its brand influence.

Turning Crisis into Opportunities

In mid-August 2008, just when Yoyu was developing rapidly, out of the blue, a financial crisis swept the globe. The company, focused on exports, was among the first to feel the chill: orders fell away to nothing; it was a winter of unprecedented severity. Transformation was the only way out.

A year later, after ceaseless exploration and practice, Chen put forward a restructuring package, and gradually completed a program of shareholding reform, and a change of direction of market and product. In 2010, the company invested RMB80 million into the construction of a bamboo furniture production base. After years of effort, it has basically completed its industrial layout, switched from bamboo flooring to bamboo home furnishing manufacture, and established stable cooperative relations with IKEA, the Swedish home furnishing giant.

The wounds inflicted by the financial crisis brought home to Chen the need to go after international and domestic markets equally. He organized promotional activities, getting the message across to designers that sci-tech advances have made bamboo a suitable material for home furnishing and decorating, reintroducing bamboo to designers so that their influence will bring bamboo elements more widely into in people's homes.

This approach has worked well. The implementation of several bamboo application demonstration projects has unleashed the potential of the Chinese bamboo home furnishing market. On March 4, 2015, Yoyu Bamboo Joint-Stock Co., Ltd. was listed on the NEEQ, becoming one of the few listed companies in China's bamboo industry.

The market listing has given Chen more courage and confidence to pursue his dream.

Opening Up Applications for Bamboo

Mr. Ruan Jianrong, president of Shanghai Jiarong Construction Engineering Co., Ltd.



Ruan Jianrong was born in 1971. He holds several posts concurrently. He is the president of Shanghai Jiarong Construction Engineering Co., Ltd., director-general of the China Forestry Industry Association for the Promotion of Bamboo Enterprise Development, director of the China Bamboo Decorative Design Union, and executive chair of the China Bamboo Brand Alliance. He vigorously leads Jiarong in exploring new areas of application for bamboo, for example, in construction, decoration and other aspects. Through his various endeavors in promoting bamboo he has left a noteworthy impact.

Falling in Love with Bamboo Happened So Naturally

His affinity with bamboo dates back to a meeting in 2012 where he learned that China Interior Decoration Association was planning to promote bamboo material. To a man with many years of experience in the architectural decoration industry, the news struck a spark inside. All of a sudden, he came up with the idea of using bamboo as a building material to replace traditional materials.

Ruan Jianrong knows that bamboo can produce oxygen and negative oxygen ions. It is a green, renewable, and completely biodegradable resource. Through scientific and technical processing, bamboo can replace wood, steel and plastic in many situations.

In order to master the features of bamboo, Ruan Jianrong went to bamboo producing areas such as Zhejiang, Jiangxi, Fujian, Anhui, and Yunnan. Immersing himself in the “bamboo sea,” he looked into the current situation of the bamboo industry, and as his studies went deeper, his ideas crystalized. Years in the architectural decoration business convinced him that using bamboo to replace traditional construction and décor materials is totally feasible. It would be change of great significance. It was a change he was very willing to lead.

Starting a Business to Set an Example

Since starting with bamboo as a material in 2012, Ruan Jianrong has invested blood, sweat and tears. He led his company to push development of the bamboo industry in information flow, brand display and project cooperation, helping the development and application of bamboo in the construction and decoration industry.

In 1992, the Jiarong Company already existed in the shape of an 11-square-meter hardware and building materials salesroom. In its early days there were just four employees; now there are over a thousand people on the company's payroll. Jiarong today is completely different. Though it has many subsidiaries, exploiting bamboo has always been a focus of management and operation.

Making good use of Jiarong management, he organized China Bamboo Decoration Steering Committee to promote guidance for using bamboo in décor. The committee brings together and enhances the effectiveness of three great resources — “information, talents, and market.” It functions as a platform to serve the development of bamboo utilization in China, and the expansion of bamboo processing enterprises nationwide.

With his effort, the national key project of China Bamboo Decoration Design and Application (Shanghai) Promotion Center was listed as Jiarong's. He provided the Center with great support in terms of personnel, site, and funds in order to develop it into a national platform for bamboo decoration research, design and marketing display, and an important base for the development of bamboo decoration. Jiarong organizes leading bamboo enterprises, scientific research institutions, and design units across China to discuss work, analyze problems, cooperate in tackling key problems, and promote the development of bamboo industry; in close cooperation with other associations, it organizes two large international forums every year, exploring new cooperation opportunities and development directions. The Bamboo Industry (Shanghai) Enterprise Management Co., Ltd., established by Ruan, binds together the development of bamboo industry and the fate of enterprises, and has achieved strategic cooperation with such places as Jiangxi.

Focusing on Key Issues, and Making Integrated Innovation

With the non-stop expansion of bamboo resource applications, certain problems gradually came to the surface — the single product nature of the bamboo industry, high developmental costs, and technical draw backs in bamboo material, bamboo decoration, and bamboo furniture.... Such issues severely impacted the expansion of applications for bamboo. In order to solve these problems, Ruan Jianrong put his mind to technological innovation in the uses of bamboo resources.

He set up a workstation of academicians and experts, attracting and bringing together a group of top professionals. Under the leadership of Zhang Qisheng, an academician of the Chinese Academy of Engineering (CAE), R&D has been

intensified and great progress has taken place. As a result, Ruan is ever more confident.

In business operations, he guides Jiarong to give environmental protection full consideration and to convert research results into enterprise development without delay. Under his leadership, the company is committed to building a green and healthy living space, never failing to push the use of bamboo.

Spreading the “Love Bamboo” Message

Ruan attaches great importance to marketing bamboo as a material. He pours his energy into getting the public to “know bamboo” and “love bamboo.”

At his instigation, a special monograph titled *Bamboo Decoration* was published in 2014 and was distributed at bamboo forums, meetings, and exhibitions to extend its influence. Besides, a bamboo product exhibition hall has been set up in Xitang, Zhejiang Province, showcasing contemporary top bamboo production technology of China. Around Shanghai, experiential tourism hotels have been built, combining bamboo material with practical application, scenic sightseeing with experience pavilion events, so that real experiences may cause more people to fall in love with bamboo.

He has established or taken over management service centers in urban communities, creative garden design spaces of world class, and centers for the promotion of bamboo in décor; he has built the China Forestry Industry Association for the Promotion of Bamboo Enterprise Development to vigorously advance and enrich bamboo culture. He also plans for Jiarong to build permanent all-bamboo structured buildings in Hangzhou so that more people many appreciate the beauty of bamboo architecture.

The Man Who Converts Bamboo into “Black Gold”



Mr. Chen Wenzhao, chairman of Wenzhao Bamboo Charcoal Company and curator of the China Bamboo Charcoal Museum

The History of Charcoal Rewritten in Bamboo

Beauty and fitness, home furnishings, deodorization and purification... today, there are more than 300 categories of bamboo charcoal products, covering a multiplicity of functions. However, few people know the birth of bamboo charcoal and the history of its industrial development.

Chen Wenzhao comes from a family of charcoal burners in a mountainous region of Suichang County, Zhejiang Province. In the 1990s, the state began to ban the use of native wood charcoal, with a view to conserving forest resources.

Generations of Chen's family had earned a living from charcoal and he began to worry. How were local farmers to manage when they depended on those mountains for survival? It was the bamboo that grew rampant all over the mountains in his locality that gave Chen an idea. Could you burn bamboo rather than wood to produce charcoal?

Without any experience to draw on, Chen spent his savings of more than RMB300,000 on bamboo charcoal. When the money ran out, he used his widowed mother's house as surety for a loan of RMB50,000, just to keep going. "I still believed I could make bamboo charcoal," and so he persevered.

On October 20, 1996, Chen nervously opened the door of Kiln No. 126. No white ashes this time! His eyes met the welcome sight of shiny black bamboo charcoal.

At last, complete success! His years of efforts were rewarded. The jubilant Chen shouted and jumped with joy. Through persistence and faith, he had vindicated himself. Not only that: he had found the way to wealth for his fellow-locals too.

Extending the Industrial Chain and Releasing Potential

This success in producing bamboo charcoal was no panacea. The market gave this new-born thing a distinctly lukewarm response. Chen showed it at the Canton Fair,

the Shanghai Fair and the East China Fair, but there was no interest and he went home empty-handed.

But he did not lose heart. He recognized his most urgent task as being to present the performance of bamboo charcoal to consumers. Accordingly, he took some of his samples to Zhejiang Agriculture and Forestry University (ZAFU) for laboratory analysis. The test results showed the absorption capacity of bamboo charcoal to be 10 times that of wood charcoal; that bamboo fiber has antibacterial, deodorizing and hygroscopic properties, and can release negative ions; and bamboo vinegar contains 180 elements beneficial to health.

Getting the results, Chen was too excited to sleep even a wink. In developing bamboo charcoal, his sole intention had been to find a substitute for wood charcoal. He had never imagined it possible for bamboo charcoal to have so many advantages. Subsequently, Chen used his charcoal to make over 300 kinds of products. In doing so he attracted the attention of the international market.

At the Canton Fair of 1997, two Japanese businessmen took a fancy to Chen's bamboo charcoal, and signed purchase contracts for 42 tons at the price of RMB6,500 per ton to clean up garbage sites and river courses. This was the first international deal for China's bamboo charcoal industry.

The success of bamboo charcoal has given a new way out for local bamboo growers in Suichang County, and the new industry of bamboo charcoal has taken shape there. Led by Chen Wenzhao, Suichang has become China's "homeland of bamboo charcoal," and Chen has been dubbed the "first person of Chinese bamboo charcoal." Currently, there are over 50 bamboo charcoal enterprises in Suichang, selling more than 300 kinds of products in seven major categories and occupying one-third of China's domestic market. With its products exported to Japan, South Korea, Europe, America, and Southeast Asia, Suichang has become the world's largest production, processing and export base of bamboo charcoal.

Using Culture to Spark Industry

"Bamboo culture and charcoal culture are both parts of Chinese traditional culture, and should be combined since the birth of bamboo charcoal." Motivated by this notion, in 2008, Chen established China's first and only bamboo charcoal museum. The museum has opened up a new development path for Suichang, one in which leisure tourism and the bamboo charcoal industry are mutually complementary.

Chen has not confined his bamboo charcoal production to China; he has expanded his business into Africa. In 2010, Chen took charcoal burners Fan Liangrong and Liang Shanren to the other side of the world to transfer their skills in Africa. They taught local officials and people, built the first charcoal kiln and explained the principle of charcoal burning and kiln temperature control.

After 15 days of firing, Africa's first kiln of bamboo charcoal was ready. "Chinese

bamboo charcoal is totally awesome!” The African learners all gave the thumbs-up. With his bamboo charcoal, Chen has opened up a new world for African people, formerly reliant on wood charcoal.

From nothing to something, from first results to quality, from Suichang to China, from China to the world...Chen Wenzhao's bamboo charcoal dream has unceasingly taken on new connotations, and China's bamboo charcoal industry, following Chen and other industry leaders, is expanding every new day.

Yu Yan's Success as an Entrepreneur

Ms. Yu Yan, general manager of Fujian Heqichang Bamboo Co., Ltd.



Heqichang Bamboo Co., Ltd. is a manufacturer of bamboo container flooring in Fujian Province. It has a long list of honors to its name: among them, national key leading forestry enterprise, leading bamboo enterprise in China, innovative enterprise in Fujian Province, and enterprise with intellectual property advantage in Fujian Province. Its trademark has been hailed as “renowned trademark in China” and “famous trademark in Fujian Province,” and its container flooring has been dubbed “top brand in Fujian Province.”

Just a few days after her 30th birthday, Yu Yan became general manager and successor of Heqichang, a family enterprise. During her six years of management, she has taken this local bamboo enterprise to the bright lights of the international stage.

From Traditional to Intelligent Manufacture

Raw materials go into the production line, and, in what seems like no time at all, bamboo floors for containers are neatly stockpiled up beside the exit. Heqichang's General Manager Yu is proudly showing off the intelligent production line, one developed in-house by the company. The previous production line needed eight operators, but the new smart one needs only three. “Over the past six years, the company has invested RMB50 million into research funding and was rewarded with two invention patents, and 22 utility model patents,” she explains.

Ms. Yu graduated with a master's degree from Manchester University in the UK in 2009. In August 2010, she gave up a favorable working and living environment in England and returned to China to help her father with the family business. She immediately put her new professional skills to work, reforming the company's growth strategy and re-orienting “to benefit from innovation, high-end products, and a large-scale production.” The company's strategy is to have a firm base in China's domestic market from which to expand internationally.

In the past six years, Heqichang has been encouraging technological innovation and environmental protection. As part of this strategy, it has cooperated with industry-university-research programs, working with the Central South University of Forestry and Technology, Fujian Agriculture and Forestry University, ICBR, and many other institutions. They have achieved outstanding results in research programs of bamboo container floors and low-carbon, earthquake-resistant bamboo dwellings.

General Manager Yu has led or participated in 12 patents, product sales of which represent over 51 percent of the company's total sales revenue. Despite national and international markets generally showing a downturn in 2014 and 2015, with the help of innovative technology, Heqichang has swum against the tide, achieving annual sales increases of 30 percent.

Opening Up New Markets Overseas

Yu Yan is not one to rest on her laurels and she is always looking for the next thing. In her first year in the company in 2010, she reformed the management style, introducing a series of innovations, such as effective staff performance evaluation, humanistic standardized management, and training of management staff. These measures helped boost management quality and promoted sound and rapid development. In 2011, with her sights set firmly on the international market, she introduced advanced production lines and built up strong customer relations with world-class enterprises such as the Maersk Line and China International Marine Containers Group.

Under Yu's leadership, Heqichang has been certified by Bureau Veritas of France and the Institute of Hong Kong Container Lessors. It has become one of China's important production bases of bamboo container flooring. And it ranks among China's top three container flooring manufacturers, enjoying a market share of 23 percent.

When describing the introduction of her products to the overseas market, Yu Yan singles out the frustrations of low brand awareness of bamboo floors among clients and their doubts that bamboo could adequately replace forest timber. In the face of rejection by a potential client, a Fortune 500 company, Yu called up the client time and time again until she won a change of heart and finally nailed a return visit. Her determination and the scientifically precise data presented finally dissolved their doubts.

Ms. Yu describes effective marketing as the lifeblood of the business, and one that must have the right talent. Introducing the intelligent production line created a surplus of workers with valuable practical experience in the making of bamboo flooring, and these supplement the marketing team. Heqichang's sales network covers more than 20 provinces (autonomous regions and municipalities) across

China. Via this network, products are exported to Europe, America, Korea, Malaysia, South Africa, Venezuela and other countries. It has become the main supplier for many famous enterprises abroad.

The “Radiation Effect” on Wider Society

Ms. Yu describes Heqichang as “a small company with great social awareness.” It is market-oriented, responsive to change and new ideas. Its “headquarters + base + grower” model is bringing farmers out of poverty. Its 20 processing bases for semi-finished products consume more than 110,000 tons of bamboo plants, indirectly contracting 6,000 farm households to plant 130,000 *mu* of bamboo. This brings each household extra income in excess of RMB30,000 annually.

Under the company’s five-year plan, the sales revenue target is RMB1 billion-plus, with tax fees of RMB30 million-plus. The company shares are to be traded on the National Equities Exchange and Quotations system. Heqichang’s aim is to become a leading enterprise in container flooring, contribute more to China’s bamboo industry and to help bamboo farmers grow wealthier.

At the INBAR Bamboo Industry Entrepreneurs Forum during the 2015 World Forestry Congress, held in South Africa, Ms. Yu delivered a speech, revealing her talents as a representative of the up and coming generation of China’s bamboo industry leaders. She called for more young Chinese currently living overseas to return to China and start up business, to take on greater responsibilities and make greater contributions to the economic development of their hometowns.

Opening Up the World of Ornamental Bamboo

Mr. Yu Zaiding, general manager of Yangzhou Dayu Ornamental Bamboo Garden



Yu Zaiding was born in Yangzhou, Jiangsu Province. They say of this place “where there’s land, there’s bamboo.” He is from a bamboo craftsman family and has only elementary school education, but he works with determination and persistence at the cultivation, study and popularization of ornamental bamboo, and is now general manager of Yangzhou Dayu Bamboo Garden.

Humble Beginnings and a Love of Science and Technology

In order to help out his poor family, Yu Zaiding stopped schooling after elementary school, and was an apprentice to a bamboo craftsman at the age of 15. Once his apprenticeship was up, he made a living by making bamboo ladders, shoulder poles, baskets, crates, beds, etc.

After the start, in 1978, of reform and opening up, he opened Dayu Bamboo Store, selling his own bamboo products. In the late 1990s, Yu Zaiding looked for new avenues and started focusing on planting bamboo. After several failures, he got on-site guidance from Professor Ding Yulong, director of the Bamboo Institute of Nanjing Forestry University, and finally mastered the secrets of growing edible bamboo shoots.

It was this experience that taught him the power of knowledge. Hampered by having no schooling beyond elementary level, study was an uphill task for him. Even so, he bought many books and subscribed to various magazines on flowers and trees. He read very slowly and asked questions of experts at every opportunity. Through a mixture of book learning and practical work, his technical level gradually improved.

The First Local Ornamental Bamboo Garden

Yu Zaiding lives in Dinghuo Town, known as a hometown of flowers and trees, where all kinds of plants grow, pine trees, plum trees, etc. But it had no ornamental

bamboo. In 1999, he established Yangzhou Dayu Ornamental Bamboo Garden, and successively introduced and cultivated more than 120 kinds of ornamental bamboo plants. Through his efforts, the area of the ornamental bamboo garden has been expanded from 22 *mu* (nearly 1.5 hectares) to nearly 500 *mu* (33.3 hectares).

He particularly likes delving into technology relating to the cultivation of ornamental bamboo, such as full-tip plant breeding, and cultivation of special forests of rhizome-bearing parent bamboos. He has also achieved success in container breeding, growing seedlings from cuttings, and light cultivation matrix formula. In addition, he employed new technology to carry out intensive standardized cultivation, and high-yield mating management.

Using new technology from colleges and universities, Yu Zaiding achieved rapid breeding of large quantities of container seedlings of dwarf bamboo. Thus, he completed his popularization project “technology demonstration and standardized container raising of ornamental dwarf bamboo seedlings.” Apart from this, he cooperated with ICBR and Chinese Academy of Forestry in a number of research projects, publishing several papers and compiling bamboo related books including *Bamboo Gardens in Jiangsu Province*.

A Few Firsts and Bests

Thanks to his dedicated efforts, the fame and reputation of Dayu Ornamental Bamboo Garden have grown within China’s bamboo circles; it has become the Yangzhou Dayu bamboo planting base of the national forest germplasm resources (including bamboo, rattan, flowers and plants) platform. It is now a scientific research base and teaching practice base for ICBR and many universities and research institutes. Besides, it has been named a national-level model demonstration unit of Jiangdu agricultural standardization of flowers and trees.

Under his management, Dayu Ornamental Bamboo Garden has grown quickly, and is now the largest and most diversified of its type north of the Yangtze River, having scores of varieties sold to a dozen provinces and regions. Many international organizations, domestic bamboo research institutes, and gardens and scenic spots featuring bamboo have introduced seedlings from Dayu.

In 2014, a new cultivar “Jin Tian Yu (Gold and Jade) Bamboo” developed by Yu Zaiding was checked and accepted by experts. The State Forestry Administration granted it a new plant variety. Then Yu Zaiding formulated local standards for Yangzhou based on Regulations of Gold Bar Bamboo Breeding Technology. He vigorously promotes and popularizes ornamental bamboo varieties and breeding technology by giving demonstrations of container raising and standardized cultivation techniques, conducting training courses, giving on-site explanations, and popularizing the features and habits of all sorts of ornamental bamboo.

Benefiting Bamboo Economy and Bamboo Culture

Yu Zaiding says the huge potential market for ornamental bamboo in China has not yet been explored. He hopes to spread the ornamental bamboo message more widely, getting more people to understand it, and thereby advance the development of the ornamental bamboo industry.

He takes the initiative to establish relations with departments of garden design, letting more designers learn about ornamental bamboo. And he supplies construction units and buyers with plants complete with good root balls and rhizomes that will adapt readily to their growing environment. He has carried out some landscape planting projects and built some demonstration ornamental bamboo landscape. Among these are: the bamboo theme landscape of Youhuang Pavilion, the second-phase bamboo pavilion in Wanhua Garden in Yangzhou's Slender West Lake resort; the poetic bamboo forest landscape of Taizhou Garden Expo Park; and the bamboo landscape of Slender West Lake's Tianmu Hot Spring Resort.

He feels that the art of bamboo, its spirit, charm, and its landscape culture are unmatched by any other garden plant. An assiduous follower of expert advice, he has built arches, a culture museum, thatched cottages and corridors of bamboo, laid paths, and built landscape bridges, with the aspiration of making the garden a comprehensive ecological bamboo garden, one that brings together the growing of ornamental bamboo, scientific research and teaching, and agri-tourism.

Professor Ding Yulong of Nanjing Forestry University describes Yu Zaiding as one of the earliest handful of farmer-entrepreneurs to engage in ornamental bamboo cultivation. Yu's love for bamboo and persistence in breeding it impresses people deeply. The charm of his amiable, humble personality and the elegant character of bamboo blend into a harmonious whole.

Careful Nurturing of “GREEZU”

Mr. Xiong Xiaohong, president of Jiangxi GREEZU Bamboo Development Co., Ltd.



Xiong Xiaohong is the president of a large enterprise in Jiangxi Province. In Chinese characters the name of the enterprise means “precious bamboo,” but its English trade name is “GREEZU.” He was born and bred in a bamboo homeland, and his path in life has been closely linked with bamboo. He has dedicated his heart and soul to the development and exploitation of bamboo products and has put blood, sweat and tears into the nurturing of the green brand “GREEZU.”

A Tough Start, Relying on “GREEZU”

Xiong Xiaohong was born into an ordinary peasant family in Chongyi County of Jiangxi Province, a place rich in bamboo resources and one of the “10 great homes of bamboo.” Thanks to being raised in such surroundings, Xiong Xiaohong’s character reflects the qualities of bamboo.

Xiong Xiaohong’s early years were not easy ones. As the eldest son of a poor family, Xiong Xiaohong had to quit education at a young age so as to help support the family. He raised pigs, dug coal, served as agricultural machinery technician, grew watermelons and vegetables, did food wholesaling, managed transportation, and grew orchids. He was known for a time as “the Jiangxi orchid king”.

It was in 1997 that Xiong’s career became associated with bamboo. That year, he bought a small bamboo product processing plant that was on the verge of bankruptcy. But it had no advanced equipment or production technology. How to bring it back to life? Xiong Xiaohong spent a year or more traveling around investigating the market, looking for new business opportunities and partners. Finally, his eyes rested on the bamboo of his hometown. He decided to commit his resources into producing bamboo flooring. In 1998, Xiong Xiaohong founded Jiangxi GREEZU Bamboo Development Co., Ltd. in his hometown.

But fortune did not smile on him. Soon after the opening, the new company ran

into financial problems. Later, with operating equipment there was overproduction and unsold products stacked up. In desperation, he rang up friends seeking advice and loans. After many twists and turns, he rustled up loans of RMB80,000 from friends, using it as comeback capital.

“GREEZU” Becomes a Famous Brand

In order to extricate his company from its predicament, Xiong hustled around the market, meeting client after client. He carried the borrowed money to attend the Canton Fair but, unwilling to spend money on a stand, he simply bought an entrance ticket and went in. But how could he show his own products when he had no stand of his own? Hooking up with someone from the same hometown in Jiangxi, Xiong placed his bamboo flooring products alongside his friend’s stand. Unexpectedly, it soon drew the attention of a Japanese customer, but he was not satisfied with Xiong’s products. Xiong Xiaohong swelled out his chest and declared his ability to improve his products to meet the customer’s standards and requirements. He issued a warm invitation to the factory to develop new products in collaboration. Xiong’s sincerity and style touched the Japanese customer who finally placed an order. It brought Xiong Xiaohong hope.

The Japanese customer had very stringent requirements on product quality, which was a real challenge for Xiong Xiaohong, then a novice in the field. Some friends advised him to accept no further orders from Japan. But Xiong Xiaohong had made up his mind: either he would make no commitment or, if he did make a commitment he would put all he had into producing the best international brand.

Xiong Xiaohong was strict in his selection of four-to-eight-year old Moso bamboo as the raw material, and about the entire production process using only environment-friendly chemicals with zero formaldehyde content. He led his staff in continual refinement of the glossiness, wear resistance, and deformation resistance of the bamboo flooring, introducing one improvement after another until the Japanese client was satisfied with the products.

“GREEZU” bamboo flooring was an instant hit overseas. The orders from Japan acted as a business card, easing access to foreign markets, and acting as a window through which foreign merchants could learn about China’s bamboo enterprises. Once the opening was made, the company received a succession of orders from other countries.

Like Bamboo Itself, “GREEZU” Grows One Bit at a Time

“GREEZU” enjoys increasing name recognition in the international market and it has expanded in scale. In 2000, the company joined the International Flooring Association; in April 2001, it was granted the right of self-managed import and export by the Ministry of Foreign Economic Relations and Trade; in June 2002,

the company obtained ISO9001:2000 International Quality Control System Certification, ISO14001 Environment Management System Certification, and European CE Safety Certification; in 2004, the company won two titles — the first “Good Faith Enterprise” in Jiangxi Province, and “Key Enterprise of Agricultural Industrialization” at the provincial level. The “GREEZU” trademark registered by the company was rated a famous trademark in Jiangxi Province. In 2006, it was awarded the “National Model Agro-Processing Export Enterprise” by the Ministry of Agriculture and won the gold medal in the “Fifth Chinese Cultural Festival Bamboo Expo”.

Under Xiong Xiaohong’s management, Jiangxi GREEZU Bamboo Development Co., Ltd. set up Ganzhou Branch, Jiangxi GREEZU Real Estate Development Co., Ltd., GREEZU Horticulture Company, GREEZU Shopping Plaza, etc., forming a Group. The expansion of the group has boosted local tertiary industry, creating jobs for many laid-off workers and the rural labor force.

Xiong Xiaohong’s struggle is not just for success in his own career, but to play a greater role in creating wealth for ordinary people, boosting the economy and contributing to social stability.

“Internet Plus” Helps the Bamboo Industry Grow

Mr. Lin Qi'en, chairman of Fuzhou Xinxing Household Products Co., Ltd.



Based in an area without a bamboo-cultivating industry and facing downturn pressure on wood furniture exports, Fuzhou Xinxing Household Products Co., Ltd. created its all-bamboo product brand on the Internet.

“Pure Bamboo” Takes the Internet by Storm

In 2015, the company department where Lin Qi'en was most often to be seen was E-Commerce Operations.

In 2016, bamboo brought Lin together with a South Korean businessman. Jang took a shine to the bamboo products Lin's company was selling via its e-shop on Alibaba, a giant Chinese international e-commerce platform. After a few weeks of on-line exchanges, Jang came to Fujian in person to negotiate with Lin at his factory in Guantou Town, Lianjiang County. In August, they signed an agreement that Jang would make a regular procurement of eight categories of bamboo products, with a total value of RMB200,000. According to feedback from South Korean dealers, pure bamboo products were highly popular in South Korea and were top sellers on Jang's trading platform.

Via Internet platforms, Xinxing's pure bamboo household products found their way onto the market in Japan, South Korea, America and Europe, and “pure bamboo products” took the Internet by storm.

According to Lin, “Currently, over 90 percent of the company's sales of Sunroom pure bamboo products come via the T-Mall e-commerce platform, and composite boards and wood products are gradually coming off the shelf.”

Is it possible that household products made from bamboo will completely take over from wood to become the company's mainstay products? Big data provides the answer.

According to Zheng Xiangrong, general manager of Xinxing's On-line Operations,

his team adjusts its market positioning on the basis of real-time consumer shopping data, and constantly optimizes product categories and services. Thanks to big data marketing, he expected that, in 2016, the company's on-line store would sell bamboo products exclusively, one year ahead of the company's schedule to switch to all-bamboo production lines.

According to statistics, in 2015, facing downturn pressure on wood furniture exports, Lin's company created its all-bamboo product brand on the Internet. Annual on-line sales alone reached RMB50 million, up 20 percent at a difficult time for wood furniture exports.

Cut One More Bamboo, Fell One Less Tree

At first glance, Lin's office seems full of sumptuous mahogany furniture, but he informs us that every piece is made entirely of bamboo.

Products made from ordinary bamboo are vulnerable to humidity and pests, a fact that for a long time meant they could not substitute for wood furniture on a grand scale. However, by using such "heavy" processing techniques as carbonizing, drying and pressing, the sugar and water content of bamboo is filtered out, which gives bamboo material a durability not a bit inferior to that of wood. In his furniture factory, Lin explained the technology employed for the production of large bamboo furniture. "Like chewing a sugar cane, bamboo is pressed into filaments and after carbonization and drying, the furniture timbers are more than five times as dense as ordinary wood."

The slogan "Cut One More Bamboo, Fell One Less Tree" is printed on the company's brochure. Since Xinxing was set up in 2006, Lin has upheld the "all-bamboo principle" in an attempt to substitute bamboo for trees, describing this as of great ecological importance when forest resources are in short supply. Bamboo is the fastest-growing of plants, reaching meters high within a couple of months and maturity in three to five years. In contrast, the growth cycle of a tree can be decades or even centuries long.

With breakthroughs in processing techniques, bamboo can now be made into large furniture such as beds and sofas. This not only conserves the natural environment but also enables the world to rediscover the appeal of Chinese bamboo. The all-bamboo idea keeps bubbling away on the Internet, attracting fans from all over the world.

"Trans-Border plus" Marketing Cooperation

In comparison with wood products, in terms of product variety and customer base, bamboo-made items have great room for improvement. Off-line customer follow-up has been vital to the company's breakthrough.

At Xinxing, its small workspace is crammed with bamboo products of different

sizes, ranging from tea trays to bookcases. Its Sunroom products have battled their way into the showrooms of Cangshan-based Xinhua Cultural and Creative Industrial Park. Zheng points to the young demographic of its customer base and to the resultant changes in consumer hot spots, to which the company responds by improving its marketing skills, refreshing its design concepts and manufacturing new products, be they small daily household products like cutting boards and chopsticks or large furniture like tables, chairs and bookcases.

At the same time, Xinxing conducts “trans-border plus” marketing cooperation. Today, by cooperating with Xiamen Shizhi Mingguai Tea Set Co., Ltd., an upmarket stone tea tray manufacturer, Xinxing’s bamboo products have gained full access to its physical shops, replacing household mahogany chairs, tables and accessories and leading consumer taste. Xinxing’s products have become an integral part of VIP room furnishings at major airports and China National Arts & Crafts (Group) Corp.’s exhibition halls, bringing home to consumers the allure of bamboo products.

From Bamboo Mats to All-bamboo Furniture

Mr. Zhong Sanming, president of Jiangxi Kangtilong Bamboo Industry Co., Ltd.



Zhong Sanming, president of Jiangxi Kangtilong Bamboo Co., Ltd., tells this story: “I remember, when I was a young boy, one day I was eating a meal in our dining room at home. To my great amazement, I happened to see a shoot drilling up out of the ground.”

Zhong grew up in a house surrounded by bamboo forests. The ubiquity of bamboo made him start pondering whether he could do something with it.

In his twenties, Zhong Sanming resolved to make something of his life and help his poor hometown become wealthier, so he apprenticed himself to several masters near and far to learn their skills. In 1990, with these skills under his belt and RMB40,000 borrowed from friends and relatives, he started up the Yifeng Bamboo Processing Plant, the first Chinese specialized producer of bamboo summer sleeping mats and bamboo chopsticks. He set out to mechanize and innovate the production of bamboo summer sleeping mats.

Soon Zhong Sanming found that the added value of local bamboo products was quite low as a consequence of extensive bamboo processing; moreover, the low price fetched by the raw material did not bring much profit to the locals. How to make good use of the abundant resources to produce higher value-added bamboo products? That was the question.

After serious consideration and research into the bamboo industry, he conceived the notion of producing bamboo flooring.

In 1998, Zhong Sanming founded the first local bamboo floorboard factory. Six years later, the factory had become a specialist bamboo flooring enterprise. In 2004, Zhong formally founded the Jiangxi Kangtilong Bamboo Co., Ltd., with its own registered brand “Kangtilong.”

It was not until getting truly involved in the bamboo industry that Zhong Sanming discovered just how great its potential was for development.

On Zhong's frequent business trips overseas, looking into just how bamboo could be used, he saw how in other countries, notably in Europe, bamboo is used in the décor of many restaurants, for the artistic and eco-friendly impression it gives. Besides, he noticed that overseas markets were very receptive to bamboo household products and the idea of bamboo furniture.

This information encouraged him greatly and strengthened his belief in eco-friendly bamboo industry.

Zhong Sanming was convinced that technological innovation is the key to maximizing the value of bamboo. Accordingly, he established a bamboo product research center, carrying out scientific and technological cooperation with the Research Institute of Wood Industry under the Chinese Academy of Forestry, Nanjing Forestry University, and Jiangxi Academy of Forestry. The research center employs a number of Chinese and foreign experts developing bamboo products and cultivating high-yield bamboos. The research center has achieved 13 new product results, some of which have national invention patents.

Through constant innovation and development, the added value of the bamboo raw material has increased from 30 percent to 80 percent. Categories of its products have been widened from bamboo flooring to all-bamboo furniture. The growth of the enterprise has also enriched local bamboo farmers. In 2004, Zhong proposed the "enterprise + base + farmer" production mode. Following this pattern, the company established eight processing bases in forestry regions and villages and helped 3,500 local households, increasing their income by a cumulative RMB230 million, and providing jobs for more than 500 local people.

Kangtilong, centered in Yifeng, has motivated local people nearby to develop a modern bamboo industry. There are currently over a hundred small supporting enterprises and the company sources 70 percent of its raw material needs from local bamboo growers. The price per bamboo has increased from RMB6 to RMB25.

Zhong Sanming is mindful of his social responsibilities and his company has donated nearly RMB1.3 million to help students from poor backgrounds get into school, and it has also funded the construction of concrete roads in mountain areas. In recognition of such actions, Kangtilong has received awards such as "Philanthropic Enterprise" and "Enterprise Supporting the Handicapped in Jiangxi Province in the 11th Five-year Plan Period." In 2011, Zhong Sanming was named among the "Ten Most Inspiring Role Models in Rural Areas of Jiangxi Province" and "Distinguished Entrepreneurs of China's Forestry Industry in 2011."

Zhong Sanming's bamboo business is a prime example of the organic fusion of ecological, economic and social benefits.

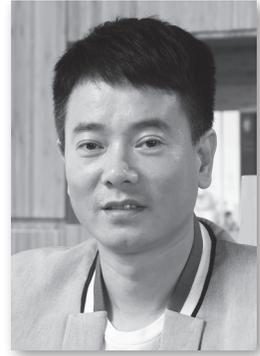
He firmly believes that, as global supplies of wood become more and more stretched in the future, and as technology improves, bamboo is totally capable of replacing and supplementing wood; also that the many superior properties and

wider application scope compared to wood give bamboo products enormous market potential. Zhong has registered his brands in overseas markets and his next target is to make his brand well-known there.

The company journeyed from making summer sleeping mats to manufacturing all-bamboo furniture. And its president Zhong Sanming discovered how to tap the potential of bamboo resources and develop a bamboo industry, thereby opening the road to riches for local farmers.

From Outsider to an Expert on Bamboo Furniture

Mr. Xu Mingqiang, president of Fujian Jiejietong Bamboo Furniture Science and Technology Co., Ltd.



In Yong'an, Fujian Province, there is a company named Jiejietong Bamboo Furniture Science and Technology Co., Ltd., where research, manufacturing, exporting, and marketing are bound as an organic whole. The company was founded in 2014, but in less than three years, it has edged into the leading ranks of bamboo furniture enterprises, becoming an executive unit of the Chinese bamboo furniture brand alliance. Within two years, its president, Xu Mingqiang, has transformed himself from an “industry outsider” into an expert in all aspects of bamboo processing. How did he accomplish this change?

“An Endless Love” of Bamboo Furniture

Prior to 2014, Xu was engaged in the operation and management of network technology and project cost consultation, and this was where he planned to develop his career. But, by chance, he accompanied some bamboo processing entrepreneurs to Guangdong to check out the market for bamboo furniture, and he discovered that bamboo then had a very small share of the furniture market, but offered virtually limitless potential. It was this trip that changed Xu's course in life.

Chance favors only the prepared mind. The trip to Guangdong ignited a passion in Xu Mingqiang. He regards bamboo furniture as a “virgin land” in need of opening up. Besides, in recent years a complete set of bamboo industrial development resources has been formed in Yong'an, covering such aspects as technology, equipment, and personnel. Furthermore, Yong'an is rich in bamboo resources. All this filled him with confidence in the future market for bamboo furniture, and laid a solid foundation for his company's reorientation.

No sooner said than done. At the beginning of 2014, Xu set up Fujian Jiejietong Bamboo Furniture Science and Technology Co., Ltd. Once the company was set up, he bought the services of Yong'an Bamboo Industry Research Institute to solve

difficult problems such as production line installation and adjustment, technology research, etc. Meanwhile, through the international (Yong'an) bamboo design competition platform, he had his products quickly brought to market.

Metamorphosis of an Outsider

As an incomer to the bamboo furniture industry, the first thing Xu did was to arm himself with insider knowledge; whenever he had a moment to spare he would go to the factory production lines, rub shoulders with the workers and ask questions of them. After nearly three years of avid learning, Xu came to understand every part of the manufacturing process, his intensive education making him an “expert” in bamboo furniture.

In 2016, Xu's company took an order for 5,000 sets of student desks and chairs for elementary and middle schools in Yong'an City. In order to ensure consistency of product quality, Xu sent batches of desks and chairs on five different occasions for testing to the Fujian Product Quality Inspection Institute. He also employed an in-house testing method, namely dropping the desks and chairs from a height of more than six meters in order to judge the robustness of the items.

In less than three years, Xu Mingqiang has completed his metamorphosis from “outsider” to “expert” in bamboo furniture.

Whole-Hearted Service a Trusty Means to Expand the Market

Along with his pursuit of product quality, the provision of first-class service and doing everything possible to meet consumers' demands is Xu's “trusty sword” for expanding the market.

Before the order went into production, Xu Mingqiang had done a great deal of work. For example, in order to understand the students' needs and provide first-class service, he made visits to every elementary and middle school in Yong'an City and talked with students and teachers, soliciting their opinions, which fed into the making of the 5,000 sets of furniture, and contributing to their success in use.

Xu always puts customers' needs first. Once, a consignment of bamboo furniture from Fuzhou Bamboo World to Pinghe County in Zhangzhou arrived in moldy condition due to heavy moisture in the warehouse; faced with the possibility of furniture worth RMB200,000 becoming worthless overnight, the client was hopping mad.

When he learned about it, Xu mollified the client, dispatched vehicles to deliver new goods and materials overnight, and promptly had the moldy furniture changed or made good; not until he saw a smile on the client's face did Xu feel a great weight lifted.

In January 2016, the office furniture produced by Xu's company caught the eye of INBAR. Bamboo office furniture such as bamboo bookcases, conference tables, and

tea cabinets took up residence in the offices of foreign experts at INBAR, bringing the humble bamboo from the mountains onto the international stage.

Under the careful management of Xu Mingqiang, Fujian Jiejietong Bamboo Furniture Science and Technology Co., Ltd. has seen rapid development. From having just one 30-category product range it now has three big ranges with over 150 categories, its products selling at home and internationally, and its output value has climbed consistently.

Pushing Bamboo Fiber as a Green Alternative to Cotton

Mr. Li Zeping, chairman of Zhuyixuan Home Textile Co., Ltd.



“We should encourage the gradual maturing of China’s bamboo-fiber textile industry, with the ultimate aim of substituting bamboo fiber for cotton, so as to build a more environment-friendly and renewable textile system.” In 2010, acting on this government strategy, Li Zeping, chairman of Zhuyixuan Home Textile Co., Ltd., made the surprise decision to switch from his existing business and build Hunan Province’s first local bamboo fiber textile enterprise.

Entering Bamboo Fiber Production

At a trade fair in 2004, Li Zeping happened to buy two pairs of bamboo fiber undergarments. It was his first contact with bamboo fiber products. The undergarments were soft and flexible and way more comfortable than any cotton undergarments he had previously worn. This sparked his interest in bamboo fiber textiles.

It was “love at first sight,” and Li regretted not having known bamboo fiber earlier. He did a survey on the bamboo fiber market and found it be still in its infancy. But the price of cotton, the most common material, was rising inexorably. “Bamboos are fast-growing, high-yield and sustainable but domestic production of bamboo fiber could not meet demand. Once production and processing of bamboo was scaled up, its production costs would be greatly reduced,” he explained.

Three years later, step by step, Li quit his profitable business and started studying in earnest, going to more than 10 cities in Jiangsu, Zhejiang, Shandong, Jiangxi, Hebei and Hunan, and making enquiries of more than 200 well-known manufacturers to learn about the bamboo fiber business. “Sometimes, I stayed in the same place for a few months,” he recalled. It was a long and arduous process, but “the deeper I dug, the more optimistic I became about its prospects. So I was more convinced than ever of the rightness of my judgment and choice.” In September 2010, Li Zeping registered

Zhuyixuan Home Textile Co., Ltd. in his home province of Hunan. Its brand “China Bamboo Textile” was introduced in the textile market.

Detail-focused and Eco-friendly

“Live by quality and develop through trust.” This was the mission statement formulated by Li. In the early years of Zhuyixuan during the process of improving technology, inevitably the company produced some below-standard products.

“Zhuyixuan aims to become a time-honored enterprise, but more important is winning people’s respect. Accordingly, we have a duty to our customers and dealers. We must pay for our mistakes. Zhuyixuan’s aim is not only to make products but to make brand-name products.” Bamboo fiber textile technology is still a work in progress, as evidenced by statistics supplied by Li Zeping: In 2004, when the bamboo fiber textile technology came on the scene, the rate of up-to-standard products was very low; in 2006, the industry-wide pass rate for bamboo fiber products was only 40 percent; by 2010, that figure had jumped to 80 percent; by 2015, it was over 90 percent.

In 2016, Li proposed to the bamboo fiber industry that “products below pass standard should not be allowed onto the market, and the cost should fall on the manufacturers.” This, he is convinced, is the only way the industry can grow healthily.

Zhuyixuan won in ISO9001:2008 quality management certification at the end of 2015. Internal controls and quality management helps Zhuyixuan effectively pursue its objectives. Zhuyixuan is currently committed to the development of high-end clothing and home textile products that offer comfort, anti-bacterial, and moisture-wicking properties, without sacrificing the fashion appeal demanded by today’s consumers.

Li Zeping has a “green dream.” He predicts that within the next three or five years, sales of bamboo fiber products will overtake those of cotton products, because prices will decline in parallel with the maturing of bamboo fiber technology. Soon, low-carbon, environment-friendly, soft and fashionable bamboo fiber products will be in every home, and the market will really enter the “age of bamboo.”

Australian Stock Exchange Listing

“Zhuyixuan has already reached the basic requirements for an Australian IPO. Of the more than 20 companies in Hunan Province, Zhuyixuan was the only enterprise to pass all our evaluation standards.” This was the comment from Cao Guoyang, chairman of HASDAQ, who led the 12-strong team of Australian securities market sponsors at the completion of investigations, on May 21, 2016, prior to Zhuyixuan’s launch on the Australian stock market.

On June 5, 2016, Cao Guoyang and his team tutored Zhuyixuan staff and stock share dealers in operating skills at the Australian stock market. This marked the

final lap of the launch. After the listing, Zhuyixuan would become the first bamboo textile enterprise in Hunan Province to enter Australian IPOs. Listing on Australia's main board would raise the international influence of Zhuyixuan and thus attract capital from overseas, thereby accelerating Li's green dream of "replacing cotton with bamboo."

Frontrunner in Bamboo Fiber Textiles

Mr. Yang Qiuliang, president of Hunan Oulinya Garment Co., Ltd.



Originating from China, bamboo fiber is known as the “China fiber,” and Oulinya is one of many thousands of bamboo fiber enterprises.

Within 10 years, Oulinya has developed a network of more than 1,000 franchises and a customer base exceeding 20 million, and profit growing at 20 percent growth year on year. From being a member of the pack, Oulinya has transformed itself to a frontrunner in the development of an ecological textile industry.

Oulinya was founded in Changsha, Hunan Province in 2006. Why Changsha? Because the city is located in a bamboo heartland, with bamboo resources in every direction. How could a member of the pack become a leader of the bamboo fiber industry within such a short period? The credit should go to one person, namely Oulinya’s president, Yang Qiuliang.

Yang Qiuliang said: “From the very outset I kept telling myself and my fellow workers that only when we have produced the best product and persist in making it can we progress toward a great future.”

Within half a year of Oulinya’s founding, it had more than a hundred franchisees. But just as Oulinya was developing quickly, a “problem product” doused cold water on employees’ high morale.

In January 2007, a severe color-fading problem appeared with a best-selling product, a pink towel. There was a large inventory of the product and the company was still ramping up its production. Nevertheless, Yang Qiuliang promptly decided to recall every towel. Oulinya also offered unconditional refunds to those who had bought a faulty towel or allowed exchange for any kind of towel in a local franchised store.

But this decision brought about the biggest “storm” since the company’s founding. For all its rapid growth, Oulinya was still only six months old and the recall applied to over a million towels. If the boss insisted on a recall, the loss would not only be

the cost of the towels themselves, but also the expenses involved in their return and exchange.

Some suggested Yang Qiuliang should cut his losses by marketing the towels on promotion, because even at the rock-bottom price of RMB1 it could claw back over RMB1 million. Yang Qiuliang struggled with this issue, but finally he refused the promotion, determinedly recalling the towels and having them burnt on the outskirts of Changsha. This action generated great admiration among franchisees, and the flame of the Oulinya brand was rekindled.

Oulinya has developed from a small company with a dozen employees to a mainstream enterprise with a staff of several hundred and a nationwide network of franchisees. No matter how great their achievements to date, Yang Qiuliang and all Oulinya people never take their eyes off the need for quality above all.

Xu Haoran, senior vice president and chief brand officer of the Far East Holding Group, has this to say of Yang: “Yang Qiuliang is blessed with keen entrepreneurial vision; every few years, Oulinya realizes a remarkable metamorphosis: the only thing that doesn’t change is its devotion to quality.” In order to lead the consumer market, Yang Qiuliang has always emphasized product innovation and business transformation. For example, he established a school-enterprise alliance, whereby Oulinya collaborates with colleges and universities in Hunan Province. Through the application and interfacing of new technologies, long-standing fatal weaknesses in bamboo fiber product have been overcome, for example pilling and difficulties in shaping. Collaboration with the Hunan Institute of Engineering has enabled Oulinya to launch at least one new product a month.

Yang Qiuliang said: “Colleges and universities have advantages in competent personnel, equipment, and technology, while our enterprise has frontline market dynamics and demands; by combining these two complementary strengths we are able to renew and upgrade our products very quickly.”

In 2010, a potential Oulinya franchisee in Sichuan pulled out because there were no national testing standards for bamboo fiber products. This incident put Yang Qiuliang in a tussle over whether or not industry standards were essential.

Yang Qiuliang was aware that third-rate enterprises make products, second-rate enterprises go in for brands, and first-rate enterprises create standards. Oulinya should strive to be a first-rate enterprise.

He decided on a program of setting industry standards. He made fact-finding visits to specialists and scholars, consulted and collaborated with scientific research teams in colleges and universities, and conducted market surveys. In March 2011, Oulinya officially launched the National Forestry Industry Standard Compilation Project. In collaboration with the Central South University of Forestry and Technology, it applied to the State Forestry Administration for the Industry Standards Project, and started to compile *Bamboo Textile Fiber Identification Test Methods*. The project soon

received special funding from the State Forestry Administration, bridging gaps in bamboo fiber industry identification testing.

Along the way, Oulinya has won many laurels: in 2010, it was rated by people.com.cn as “China’s Best Brand Developing Company for 2010”; in 2012, Yang Qiuliang was named among the “Top Ten Leading Figures of Hunan Forestry Industry for 2012”; in 2012, CCTV News Broadcast, with a feature story used “Hunan: Convoying Small and Medium-Sized Enterprises into Transformation and Upgrading,” reported the successful transformation of Hunan Oulinya Garment Co., Ltd. into a benchmark for the province.... “Leading Fiber of China” is Oulinya’s declaration of quality. It is also Yang Qiuliang’s dream of becoming leader of the pack in ecological bamboo textiles.

A Wonderful Life in a Bamboo Craft Museum

Mr. Lu Junqian, curator of the Mingjiang Bamboo Craft Museum, Fujian Province



Lu Junqian, general manager of Weiyu Furniture Co., Ltd. (Xiamen Mingjiang Bamboo Craft Museum), is an expert in Chinese bamboo culture. He is determined to carry forward this traditional culture through exquisitely carved bamboo products.

Lu Junqian originates from Longyan in Fujian, where he was born into a family of returned overseas Chinese from Indonesia. Longyan, an old revolutionary base area, a homeland of bamboo surrounded by evergreen mountains and clear waters, is a place rich in natural treasures and heroic history.

Growing up among bamboo forests, Lu Junqian had a fun-packed childhood. He likes to revel in the faint, lingering memories of the golden sunshine, the fresh air, and the rustling of bamboos. As a youngster he took endless delight in things made from bamboo: grasshoppers woven from bamboo strips, shade hats, winnowing pans, baskets, shoulder poles.

His happiest time was going up the mountain to tend the orchard with his father. They would carry with them rice-packed bamboo-tubes, deliciously aromatic. Paired with the unique taste of wild vegetables it became Lu's favorite delicacy, a beautiful memory of his childhood.

In 1997, Lu Junqian was drafted into the army, where his steel will and selfless spirit was forged. In 2000, he returned to civilian life and started work in a large enterprise in Xiamen where he soon became a key employee. However, years of city life made him yearn more for nature, missing the bamboo forests of his hometown. From time to time he would dream of bamboos, with their tall and handsome bearing and their refreshing fragrance. They were calling him back.

Lu Junqian is aware of the general hankering that modern city dwellers feel to be close to nature, to return to an ecological environment; at the same time, a global shortage of wood resources together with water loss and soil erosion mean

the environment has been severely affected. In this situation, bamboo has some very obvious plus points, for example: easy breeding, fast growth, early maturity, high yields, and a short growth cycle. Furthermore, with one successful plantation, selective felling can continue year after year, allowing long-term exploitation without destroying the eco-environment. Such things add up to the huge market potential for bamboo as material in construction, furniture, handicraft production, paper, etc. In 2014, Lu Junqian decided to create a vehicle for transmitting bamboo culture. In cooperation with some well-known Chinese enterprises, he established the Xiamen Mingjiang Bamboo Craft Museum.

To enter the museum is like entering a bamboo culture expo. It provides a platform for spreading and exchanging bamboo culture, allowing people to know, appreciate, and experience bamboo. It is not only a bamboo culture museum but also a bamboo art gallery and bamboo life experience pavilion. Within it are the Tea Set Hall, Daily Life Hall, Hall of Calligraphy, Painting, Music and Art, the Bamboo Crafts Pavilion, Red Pavilion, Overseas Chinese Bamboo Pavilion, Cross-Strait Bamboo Culture Communication House, and the Popular Science Education Center. There is a great variety of items on display. Apart from modern bamboo crafts, there are ancient bamboo musical instruments; ancient poetry, painting and calligraphy on bamboo; bamboo weapons from ancient wars; and bamboo hats, canes, stretchers and kettles from the Revolutionary Base Area. In addition, there are the most primitive bamboo products of the common people, and the coolest bamboo toys of childhood memory. Visitors to the museum say every detail stirs up the sincerest and original memories, which can impart a new awareness of bamboo and a new awareness of life.

Bamboo has always occupied an important place in the hearts of the Chinese, and has played a very significant role in the development of Chinese literature, painting, arts and crafts, garden art, music, religion, and folk culture. With the development of modern industrial and commercial civilization, the slow pace of life that bamboo represents, a life that is natural, casual, simple, relaxed, low-carbon and eco-friendly, is calling through the most primal memories for the soul to return and for life to change direction. Without noise or fanfare, like water and wind, it penetrates every corner of life.

“Bamboo crafts have smooth texture, natural beauty, and pleasant fragrance. And with the passage of time they develop a refined and elegant patina that is pleasing to the eye. In addition, they can purify air and absorb ultraviolet light; they are sound-absorbing and sound insulating, moisture resistant and thermoregulatory, warm in winter and cool in summer. What’s more, they imply auspicious meanings such as peace, better life, wealth and rank.” With its unique bamboo culture, Mingjiang bamboo crafts are winning ever more favor with people today.

The museum regularly runs bamboo classes, salons, forums, and craft contests,

getting children to make various bamboo toys such as dragonflies, grasshoppers, and flutes. The kids are also taken to the planting base to appreciate the character and charm of bamboo. The bamboo culture salon and bamboo craft contest have drawn more and more bamboo lovers to gather together. Through talking, chanting poems and drawing bamboo, they express their sentiments about bamboo, gratitude to nature and love of life.

As a son of the land of bamboo, Lu Junqian's dearest wish is to carry forward China's bamboo culture, so the whole world may appreciate the unique charm of traditional Chinese culture.

Building Dreams with Bamboo

Mr. Wang Shuchun, president of Sichuan Lüye Landscape Co., Ltd.



Many years ago, Wang Shuchun came to public notice as chief designer of the Living Water Garden and the Panda Base of Chengdu. More recently, he has been advocating his garden-creation concept of “building bamboo gardens, writing about bamboo and finding pleasure in bamboo” and designed the International Garden of Bamboo and Rattan in the Xi’an and Qingdao international expositions respectively, both of which were acclaimed. He is also reputed as a master of landscape garden design, with a natural and unique style of his own, owing allegiance to no school.

Dedicated to Creating Bamboo Gardens

Wang was raised and shaped in the bamboo culture of Sichuan. He loved beautiful bamboo lanterns, and went to the arts and crafts association to learn how to use bamboo to fashion fans, boxes, brush holders and sculptures. Every use of bamboo in the countryside — bamboo plates, bamboo passages, bamboo shoots, bamboo poles, bamboo bridges, bamboo tools, bamboo beds, bamboo ropes, etc. — impressed him deeply.

After starting work in the Bureau of Parks and Woods, Wang participated in the mapping and designing of ancient structures in in Chengdu’s Wangjiang Park, a park notable for its bamboo varieties, bonsai bamboos and bamboo and tea gardens. This park became a major tourist magnet, drawing a nonstop stream of visitors, and for Wang personally the experience enhanced his understanding of bamboo and bamboo culture.

When Chengdu built the Panda Base, Wang was made chief designer, and there was unanimous endorsement for his guiding concept of “bringing the pandas back home.” The mountains, waters, forests, bamboos, fields, gardens and scenery designed by Wang simulated their interplanted forest habitat. This back-to-nature design won him positive comments from the bamboo expert circle and beyond,

notably from Portugal's Professor Viegas, member of the INBAR board of directors, and SYTS Landscaping, an international company of gardening.

International Garden of Bamboo and Rattan: a Great Success

At the Xi'an 2011 International Horticultural Exposition, Wang designed the International Garden of Bamboo and Rattan. Commissioned by INBAR, everything in the Garden was made of bamboo or rattan — exhibition halls, exhibits, vegetation, roads. There was no exception.

It had always been a dream of Wang's to create a bamboo and rattan themed park, one that could demonstrate their utilization and cultural appeal in a modern context. The Expo gave him his longed for opportunity.

Initially, the municipal authorities invited a number of Chinese and foreign experts to submit designs. At the time, Wang Shuchun was on the review panel and drew the conclusion that, though each had plus points, they shared a lack of connection with local bamboo culture. The authorities took his opinion on board and asked him to submit a design concept the very next day. After an all-night work session, he decided on the theme "Nature and Man in Permanent Harmony: City and Nature in Creative Coexistence," and the publicity slogan of "Green, the Fashion Trendsetter." Inventive and unique, his design was perfectly in tune with the exposition theme.

In a radical departure from the traditional approach, Wang's creation, based on the exclusive use of bamboo, was a holistic blend of modern production technology, planting techniques, scientific methods, green ecology and landscaping techniques. The design was refreshing in various ways. The centerpiece was the main exhibition hall, an all-bamboo polygonal structure to house exhibits made of bamboo and rattan exclusively. Outdoors would feature bamboo flooring, bamboo bridges, bamboo platforms, bamboo railings, bamboo flower ponds, etc. In addition, varieties of bamboo would be planted everywhere.

He proposed the bold theme of basing the garden on bamboo and rattan culture and promoting the utilization of these materials, so as to demonstrate the global research findings on bamboo and rattan and their applications. The Garden was a huge success and was rated highly innovative. Experts from INBAR and other organizations were very approving.

A Cultural Palace of Bamboo and Rattan

Wang's design team, construction team and management team conducted many trials, making maximal use of bamboo and rattan, and producing first-class bamboo and rattan products. International attention and awards followed apace.

At the invitation of INBAR, Wang led his team to the 2014 Qingdao International Horticultural Exposition, where his International Garden of Bamboo and Rattan

highlighted the distinct features of Chinese bamboo and rattan culture and displayed the development of bamboo and rattan by INBAR member countries. After repeated rethinks and improvements, he designed the Cultural Palace of Bamboo and Rattan, a low-carbon garden of bamboo and rattan products.

The bamboos, rocks, vistas and groves in the garden testified to the great efforts of Wang and his team and this garden proved even more entrancing. At the entrance was a view in the shape of bamboo shoots. Inside came presentations on the cultivation, harvesting and utilization of the bamboo and rattan resources of INBAR countries involved. There were also displays on personnel training, technological exchanges and achievements. The all-bamboo exhibition hall symbolized a sailing ship, and colorful pavilions symbolized the many countries involved. In addition, there was a network of pools, surrounded by bamboo and fed by running water, and a bamboo corridor running through the garden just like the ancient Silk Road. At the lowest point, an arched corridor of rattan ran over the water and at the highest end stood a bamboo pavilion to give shelter from rain and wind.

Finally, thanks to its unique bamboo and rattan culture and rich international flavor, this garden was evaluated as the people's choice and was among the top three in the honor awards.

A Villager's Invention for Peeling Bamboo Shoots

Mr. Zhou Jindi, Lijia Village, Tonglu County, Zhejiang Province



National Television Comes to a Little Village

On May 21, 2015, Lijia Village, Tonglu County, Zhejiang Province, was a hive of activity and excitement. Why? Because a crew from China Central Television (CCTV) was there for a week's filming, for the program *I Love Invention* on CCTV's Science and Education Channel. The focus of interest was a villager, Zhou Jindi, and his invention, a machine for peeling raw bamboo shoots.

I Love Invention is the first TV program encouraging Chinese people to create inventions and use them to start a business. The concept is to spread a philosophy of "Invention can change lives, knowledge can create wealth." They staged a "Man Versus Machine" bamboo shoot peeling contest in Zhou Jindi's yard, and gathered a crowd of spectators from all around to witness whether human hand or machine would peel best and fastest.

In the arena, 10 capable peelers formed a team, set against Zhou's peeling machine. At the signal for battle to commence, the human team set to and the machine went into action, controlled by Mr. Zhou. Half an hour later, the machine was declared winner, operating 10 times as fast as its rivals.

"This match is the best demonstration of how efficient mechanical peeling is. I hope once the TV show airs, it can bring commercial opportunities!" said Zhou, in excitement.

A Worker with a Passion for Invention

That July, the show aired to a very wide audience. The machine's efficiency and ease of operation attracted the interest of bamboo shoot farmers and processing businesses. They bombarded Zhou with enquiries, in the hope that the machine would make their work easier.

The machine comprises roller assembly, elastic press equipment, drive parts and

body. It uses special roller wheels and axles on rolling technology to remove the skin from the flesh of the shoots and spit them out fast and separately, without damaging the shoots. It's nothing special to look at, but it scores highly on practicality, reliability, simplicity and ease of operation.

Fifty years old this year, Zhou Jindi is a native. Even though he left education after middle school, he has a lot of experience and a strong passion for mechanized manufacturing, especially in small metal mold material punch processing. At home, he has a little storeroom to keep machine parts and this is where you can often find him at any time of day.

Quite by chance, Zhou happened to hear a friend who ran a bamboo shoot processing factory complaining about the shortage of manpower for stripping the skins off bamboo shoots and bemoaning the lack of an efficient machine to do that work. Zhou was well aware too of the tough and time-consuming work all the villagers had to do when it came time to harvest the shoots. The idea of inventing a machine to relieve locals and friends of this arduous task began to germinate. From then on, he dedicated his time to creating a high-efficiency bamboo shoot peeling machine.

The Birth of a Successful Bamboo Shoot Stripping Machine

Mr. Zhou had once seen a cornhusking machine in Hubei Province; its efficiency had amazed him then and it inspired him now. He believed it possible to imitate the cornhusker, despite the differences between bamboo shoots and corn, given that there were many similarities in the functional principles.

After careful consideration, he bought a cornhusker from Hubei Province to study and learn from, and gave himself totally to his invention, experimenting night and day with no time off. Finally, he produced Version 1.0. He experimented on this machine, removing the skins from the first harvest of winter bamboo shoots right through to the following year after the end of the spring bamboo shoot season. He improved the prototype to create a second machine. This was more efficient but still not what he aspired for.

After three years of painstaking efforts, in April 2014, Zhou made a breakthrough on two core parts of his machine. It had cost him RMB100,000 in investment, but Version 3.0 was a total success! The raw bamboo shoot peeling machine has a list of advantages; among them, a high degree of automation, good continuous production, simple structure, and ease of operation. Once the shoots are fed in, the peel automatically passes through the outlet. The machine can peel 500kg of bamboo shoots per hour.

Zhou is really proud to talk about his invention. His machine deals with raw shoots, whereas other peeling machines require the bamboo shoots to be boiled first, a process that sacrifices nutrition, texture and flavor. His machine has the smart

addition of an elastic press that enables the hard skin of raw bamboo shoots to be removed easily. Another selling point is that his machine can adapt to different sizes of bamboo shoots, greatly improving efficiency and saving time and effort.

The machine has received a utility model patent certificate issued by the State Intellectual Property Office. The thing that most pleases Zhou is that fewer and fewer farmers are hand peeling bamboo shoots now, and that his machine is helping more and more of them raise their productivity and lower their labor costs.

Zhou's hope for the future is that his machine will win greater recognition and go into more widespread use, thereby helping more bamboo farmers towards an easier and wealthier life.

A Bamboo Board “Star” Arrives from the Mountains

Mr. Tao Zongjing, general manager of Huachang Bamboo Industry Co., Ltd., Yong’an City, Fujian Province



“Our company’s bamboo boards are RMB5 per square meter more expensive than those of the same specifications produced by other enterprises, and our clients have to pay first before we deliver. Even so we can’t meet demand,” declares Tao Zongjing proudly. Tao is the general manager of Huachang Bamboo Industry Co., Ltd., Yong’an City, Fujian Province, a bamboo enterprise in the heart of the mountains, and a bamboo board “star” in the eyes of the people.

Arriving at the Critical Moment, Reforming the Production Process

In October 2005, attracted by the bamboo resources of Yong’an, Zou Huaduan and Tao Zongjing came to Xiaotao Town in Yong’an, where they co-founded Yong’an Huachang Bamboo Industry Co., Ltd. together with other partners, to produce mainly bamboo floor boards. Tao was in charge of management.

The bamboo market was volatile. In April 2005, when Zou and Tao were doing market research before opening their company, Xiaotao’s Moso bamboo cost RMB9 per *chi* (one Chinese foot), but it skyrocketed to RMB16 per *chi* six months later, greatly pushing up the cost of production and wiping out the profit margin. Between 2006 and 2008, with competition becoming ever fiercer due to the nationwide mushrooming of enterprises producing bamboo floorboards, the company was facing collapse. In 2009, Zou Huaduan was recalled to the headquarters of the Huachang Group, and Tao Zongjing became the general manager at this critical juncture and started to reform the floorboard production process.

After some market research, Tao Zongjing discovered that the selling price for boards made of bamboo strips spliced horizontally was just half of those made with side-spliced bamboo strips. Since their own boards were of the horizontal type, it was no surprise that the profit margin was squeezed to well-nigh nil. With the problem pinpointed, Tao would visit the workshop daily to experiment with side-splicing.

After countless attempts, he eventually succeeded in making side-slice boards. The company's fortunes turned a corner; it was saved from bankruptcy.

Tough Enough to Take a Forklift

Having tasted sweet success, Tao Zongjing became profoundly aware of the great importance of technological innovation to a bamboo enterprise and he eliminated obsolete equipment.

Business is like a battlefield. In 2013, as the market for side-spliced bamboo boards gradually overflowed with similar products, the company had no choice but to blaze a new trail. Tao was optimistic about the market prospects for bamboo furniture boards, and the green shoots of an idea formed in his mind — manufacturing boards for bamboo furniture.

He lost no time in putting this idea into practice, but boards for furniture have to be longer than floorboards, so it was quite a challenge to make top-notch bamboo furniture boards. Besides, furniture boards must be perfectly smooth and totally color-consistent. Initially, the boards Tao and his workers processed were sub-standard. Through trial and error and after learning from craftsmen in the trade, they eventually mastered the technology of furniture board production. Once the products were launched, orders arrived in a steady stream.

“After rough planning, the bamboo strips must undergo high-temperature carbonation within five hours; any more than eight hours after, and the bamboo strips will turn dark, in which case they are only good for the bottom boards of furniture, not for the facings, and there is a huge price difference between the two,” explains Tao expertly.

Meticulous control over each step of the process is Tao's unerring policy. In November 2016, reporters from the program *Novel Space* on CCTV-7 came to the company to record the processing of bamboo boards. In an experiment recorded on camera, workers laid Huachang bamboo furniture boards on the ground and drove a six-ton forklift truck over them. To the astonishment of the onlookers, the boards remained undamaged.

The Moisture Content Problem Solved

It has been of perennial and critical importance to keep the moisture content of bamboo board under eight percent. Failure to do so means that the enterprise stands no chance in the market. Yong'an's location in a mountainous area of southern China makes it very humid; its air has a moisture content of over 20 percent, and this can exceed 40 percent in spring. By contrast, the air in northern China, the USA and Europe is very dry. If the moisture content of furniture boards made in Yong'an is not brought under control, on arrival in the said region or country they may crack or deform and be returned to the manufacturer. Faced with this problem, Tao Zongjing

and his workers carried out trial after trial.

To ensure that their bamboo boards would not crack or deform on arrival at less humid destinations, Tao Zongjing had the bamboo steam-treated first, which took the moisture content of the bamboo strips above 80 percent, to saturation point. Once dry, they were carbonated and baked. When the moisture content fell to between six and eight percent, the bamboo fibers lined up as in a hollow brick, becoming as hard as steel, dispelling the slightest concern that the material would crack due to climatic differences.

Tao Zongjing has taken bamboo boards to the height of perfection; they are their own best advertisement. Orders for bamboo furniture boards come in from numerous big bamboo furniture enterprises and the bamboo furniture he produces is sold in the world-famous IKEA stores.

How Outdoor Bamboo Scrimber Flooring Came into Being



Mr. Yin Yijian, chairman of Fujian Yong'an Youzhu Bamboo Co., Ltd.

November 2016 saw the official opening of a coffee shop. Nothing new in that, you might say, but this was China's first all-bamboo coffee shop, and a showroom for Fujian Yong'an Youzhu Bamboo Co., Ltd. It is furnished throughout in bamboo scrimber, with tables and chairs, flooring, background wall, shelving...all fashionable, environmentally friendly and exuding natural style. In the bamboo coffee shop, the company chairman Yin Yijian, told the history of his company.

Bamboo Floor as Heavy as Rosewood

Yin was born in 1985. He started work in Yonglin Bamboo Co., Ltd. after graduating from university in 2010. Among his many roles there, he worked as a driver, computer maintenance technician, website administrator, and salesman. His hard work and impressive sales record paid off, and several years later, he won promotion to sales director.

Yonglin Bamboo Company went in for highly efficient bamboo raising and development of new bamboo scrimber products. In its heyday, it was a national high-tech company, a provincial key leading enterprise in industrialized forestry, and the cooperation company for the international bamboo scrimber project. It had top experts in bamboo breeding, R&D and technological innovation in bamboo products, and master of advanced bamboo scrimber manufacturing technology. It was the first enterprise in Fujian Province to research bamboo scrimber for outdoor use.

For a variety of reasons, Yonglin Bamboo hit difficult business conditions and closed its doors in December 2014. But Yin Yijian did not give up. And it was not long before he and his colleagues Chen Libi and Chi Zhirong and several others were discussing a new business. With RMB10,000 in the hand and dream in the heart, Yin led his friends toward a bamboo processing start-up.

Their new business, Youzhu Bamboo Company, was set up in March 2015, after preparing all the facilities and human resources — premises, equipment, test labs, production team and sales team. Many of the former Yonglin company's technical specialists and workers were reengaged, absorbed by the new company.

The density of Youzhu Company's outdoor bamboo floor is over 1,300 kg/m³ and it is as hard as prized rosewood. When put into water, it immediately sinks to the bottom. Flooring and other bamboo scrimber products made of five-year bamboos can substitute for hundred-year-old hardwood trees, which will greatly reduce felling.

Good Quality, Good Service and Good Sales

In order to ensure the quality of its scrimber, Youzhu set up a quality control and testing lab for checking the density of flooring and resistance to splitting of its floorboards. Good products speak for themselves. From their appearance on the market, Youzhu's bamboo scrimber products were snapped up and orders streamed in from all over. In the space of a year, it received orders for major projects, among them the walkways of well-known Huangguoshu Waterfall National Park in Guizhou and of Bayi Reservoir in Fuzhou.

Having good products is one thing, efficient delivery is another. But the density of these bamboo floors and other scrimber products present challenges for transportation over long distances. Accordingly, Youzhu set up warehouses in cities like Beijing, Chengdu, Guangzhou, Xuzhou, and Chongqing, making it possible to guarantee five-day delivery. These depots also help to cut the cost of transportation significantly.

Sales are made on-line and off-line. Off-line provides access to feel the floors and is the chief sales route; on-line offers fixed prices, faster and easier processing and order-handling. The two sales channels have won Youzhu a stable client base; it currently has more than 200 fixed outlets and a national sales network.

With more orders coming along, Youzhu is expanding its production scale. It has three factories producing bamboo scrimber flooring, and one of these is installing four additional production lines. "You have to speculate to accumulate," as the saying goes. Youzhu, in its first year, performed well, achieving a turnover of RMB20 million.

Pursuing the Bamboo Dream Regardless of Hardships

Behind this excellent performance lie the efforts of Yin and his team. The oldest of these is Chen Linbi, who is the same age of Chairman Yin. He graduated from Fujian Agriculture and Forestry University in June 2007, and was taken on by Yonglin Bamboo Company. There, through his hard work, he moved through the ranks, rising to vice general manager of the production department.

When Yonglin ceased production, both men received highly paid job offers from another enterprise, but they refused and went into business on their own account.

In June 2015, in order to deliver some floor samples to potential clients, the partners drove for 30 hours, taking turns at the wheel, to Zhejiang, Guangdong, and elsewhere. Their efforts won them clients.

Opportunity favors only those prepared to take it. Chairman Yin, the “prince” of bamboo scrimber, will certainly lead his team to a more brilliant future.

A Young Returnee Entrepreneur's Bamboo Further-processing Chain



Mr. Gao Yuan, Anhui Hongxin Bamboo Corporation

Gao Yuan, a man in his thirties, has never been one to rest on his laurels. He majored in international trade in Beijing, and engaged in real estate development before going to work in a foreign trade corporation. There he met his future wife, a life and career partner. Finally, as luck would have it, he went into business for himself in the bamboo industry. He set up Hongxin Bamboo Corporation and committed himself to building up his bamboo deep-processing chain.

An Honest and Enterprising Journey

Blessed with mountains and rivers, southern Anhui Province abounds in bamboo, which has a short growth cycle and reproduces rapidly. In addition, the mountainous area had multitudes of local small workshops producing a miscellany of semi-finished bamboo products on a small scale. Equipped with experience amassed working for a foreign trade corporation and the know-how acquired working abroad, Gao Yuan quickly became aware of the untapped great commercial potential here.

In 2010, he won a student-entrepreneur interest-free loan from the government and leveraged this to borrow more money from friends. Then, without hesitation, he spent all the money buying raw materials and land for a factory. He established his corporation and embarked on his bamboo deep-processing production. Last year, the company's turnover was RMB15 million with foreign exchange earnings of US\$2 million. The profits and taxes paid exceeded RMB1 million.

Gao talks slowly, even when recounting the hardships of the venture period. In common with the vast majority of successful ventures, it was no walk in the park. Lack of funds was only part of the problems; pressure from every direction, lack of experience, and funneling access to foreign trade channels were a few of the others.

Once, a Germany-bound container full of bamboo products was held up on route and by the time it arrived, the moisture in the bamboo had evaporated and they had

actually gone moldy. “But even so we chose to give a free container of products to the client, who was merely to cover the freight charges. We lost nearly RMB100,000, which dealt us a heavy blow at this stage. However, we have been doing business with each other ever since,” says Gao.

Gao’s sense of responsibility and aspiration, plus support from his wife and relatives brought him through the hardships of this period. Since his export channels are mostly Europe-based, his major challenges are coping with jet lag, communicating with his clients promptly and effectively, and providing after-sales service.

Gao’s wife, a business Japanese major, helps him a lot by responding promptly to clients, often until midnight, allowing Gao to devote his full attention to production. His elder sister, resident in Germany, helps with local after-sales service, which is a major factor in sustaining the corporation’s reputation and ensuring repeat business.

Two Ideas for the Way Forward

“European standards” and “great craftsmanship” have been Gao’s two key concepts for his corporation’s development path in recent years. European Standards is the stipulation that the high demands of European clients must be met unconditionally in the production process. They require exceptional quality, compliance with international environmental standards, sufficiency of product lines, complete range of sizes, adequacy of stocks of raw materials in off-seasons, and advantageous pricing when the above conditions are met.

On the subject of craftsmanship, Gao explained that bamboo-processing is still an industry of individual artisans, the manufacturing process not highly scientific nor regulated by systematic production standards. Instead, there are plenty of tricks of the trade and delicate skills, and the artifacts are highly dependent on the control and hand working of the craftsman.

In training new workers, Gao and his workshop managers take new recruits by the hand like children, so that the experience and skills acquired through long practice can be quickly absorbed by the new recruits. He quipped, “Our managers are not managers in the traditional sense but rather on-the-spot managers, supervising and correcting immediately.”

Asked by a journalist whether his business had suffered from the generally grim export environment in recent years, he answered happily that business was maintaining a 15 percent annual increase. This he attributed to great performance on cost-effectiveness, followed by excellent after-sales service and his awareness of risk management.

As for his company’s future, the 30-something was like a little kid, excitedly showing the journalist all sorts of bamboo handicraft works and tools, and mentioning the famous hotels and decorating companies that form a loyal client

base. He also talked about his ideas for workshop expansion, experience shops and the improvement of his e-commerce platform.

It seems that his entrepreneurial passion has never left him. It just continues to intensify.

Opening Up the Market for All-bamboo Skateboards

Ms. Zhang Limin, general manager of Fujian Yong'an Minxing Sports Goods Co., Ltd.



In 2013, Ms. Zhang Limin was appointed general manager of Fujian Yong'an Minxing Sports Goods Co., Ltd., which is located in the Nige Development District in Yong'an City, Fujian Province. Together with her father, she embarked on the making of bamboo skateboards.

In the short space of four years, the company rose to the challenge of upgrading its all-bamboo boards to fiberglass-reinforced bamboo boards. Zhang Limin herself designed some one hundred boards. The company's current annual output is 70,000-plus boards and 200,000 semi-finished boards. The company joined the Chinese Bamboo Product Brand Association in October 2016.

Supporting the Family Business

Ms. Zhang fell deeply in love with bamboo skateboards at a very young age.

It was her father, Zhang Xinyong, who established the company in 2000. The most important product at the time was the wooden plate of skateboard decks for selling into American and European markets. Skateboards were not well-known in China at that time, but they were already a favorite toy for the little Miss Zhang.

In 2003, the company "tested the water" for boards made of bamboo. After four years of overcoming technical difficulties such as breaks and delaminating, they went in for large-scale production of semi-finished all-bamboo skateboards. The USA and Europe have few bamboos, so all-bamboo boards soon found favor when introduced to these markets.

Zhang Limin used to play around in the factory and watched the manufacturing process. Her father's unflagging efforts in research and innovation left a deep impression on the little girl.

In 2013, she followed her father and joined him in the skateboard production business.

Integrating New Technology

Zhang Limin's and her father's efforts paid off. Rising once more to the upgrading challenge, in 2014, the company produced bamboo-fiberglass boards, the result of an arduous research effort, mixing bamboo with shatter-proof glass fiber, a material of high tensile strength. There are two categories of bamboo-fiberglass boards, namely single-fiberglass and double-fiberglass boards.

The double-fiberglass all-bamboo skateboard sold for as much as RMB1,700 on the US market. Many foreign customers rated its performance very highly, pointing to the advantages of the all-bamboo cruiser skateboard, namely flexibility, toughness, and 10-year life expectancy.

The rising popularity of skateboarding in China led Ms. Zhang and her father to open up the domestic market by promoting their own "Pointcool" brand in China while producing quality semi-finished boards for the overseas market.

Immediately on joining the company, Zhang Limin started an on-line store selling "Pointcool" skateboards of her own design. In September 2015, the company won trusted supplier status on Alibaba's e-commerce platform. On-line stores created a display platform for these fashionable skateboards, and the superb craftsmanship attracted many retailers throughout China.

In 2016, the company participated in the eighth "Boundless Love" international charity, held in Beijing under the aegis of the Chinese Ministry of Foreign Affairs and the China Foundation for Poverty Alleviation, and its unique, eco-friendly all-bamboo skateboards won widespread popularity.

Innovating Bamboo in a Hundred Ways

Originally, the company only made two forms of boards, tipped up on one end or both ends. Ms. Zhang wanted more categories, so she developed her design skills from nothing, becoming more inspired as she continued. So far she has designed and developed almost a hundred different shapes of board.

The design must be absolutely accurate. An error of one or two millimeters in the machining can totally destroy the deck and it will go to waste. In her first days in the company, the novice Zhang worked with the newly-purchased 3D cutting machine every day, studying its structure and functions, looking into computer software to produce deck designs.

In no time at all she designed a deck of her own for the first time, a perforated board. To ensure the holes maintained a constant 2.5mm diameter, she adjusted many times, revised the draft design more than 20 times, and test-cut 20 decks. In three days, she finally succeeded.

Encouraged by her first success, Ms. Zhang became more inspired, perhaps adding a handlebar to the deck, perhaps making them in rainbow colors. The range took flight in a hundred different boards.

In April 2015, in an on-line chatroom, a client in Fuzhou expressed great praise for the drift skateboard designed by Ms. Zhang, and within a few months nearly 40,000 of this model were sold.

In May that year, she designed the mini “Worm Skateboard,” with a 40cm deck. This was snapped up by retailers soon after its appearance on the market. It was soon averaging sales of 600 units a month.

Another design of hers, the “Angola,” part of the “Cool Dragon” series, is a dancing skateboard. It is 1.22 meters long, made from Canadian maple, Chinese bamboo, and shatter-proof fiberglass, bringing together every aspect of all high-end workmanship and beautiful colors and motifs. Skateboard fans fell in love with it.

Innovation has no boundaries. In Zhang’s opinion, only if there is constant innovation can skateboard connoisseurs have a better experience, and the company will not be swept away by market competition.

Special Star Group's Domain of Bamboo

Mr. Liu Xiaojun, president of Chongqing Special Star Internal Door Set Group Co., Ltd.



Chongqing Special Star Internal Door Set Group Co., Ltd. is China's largest specialist manufacturer of internal door sets using bamboo in place of wood, and has been dubbed "the star of China's door industry."

Liu Xiaojun took up the post of company president in 2004. Since then, he has steadily developed the bamboo door industry, building on what the previous generation achieved in the use of bamboo materials.

In 2003, the company's turnover was RMB30 million, and the chief question facing Liu Xiaojun was how to increase sales. At the time, real estate development was booming in China, and Liu seized this opportunity, expanding the scale of production of composite internal door sets.

When an industrial zone was being constructed in Kaixian County, Liu Xiaojun lost no time in making the wise decision to have a presence there, which laid a solid foundation for large-scale production of bamboo composite internal door sets. Under his leadership, the company acquired more than 26.4 hectares of land and invested RMB200 million, building a factory covering an area of 30 hectares, with three lines producing 1.5 million bamboo composite internal door sets annually.

Liu's decision proved a correct one. In 2004, sales turnover from bamboo composite internal door sets exceeded RMB100 million. Between 2005 and 2007, sales witnessed annual increases in excess of RMB100 million net for three years running. By 2007, sales turnover reached RMB400 million. Since 2008, the company has been producing over a million bamboo composite internal door sets a year, with annual sales revenue topping RMB700 million. Thus, the exploitation of bamboo entered the stage of long-term, large-scale industrialized development.

In order to optimize the use of bamboo resources, exploiting the whole plant

and using it more efficiently, Liu Xiaojun began to explore the efficient utilization of small-diameter bamboo.

Liu Xiaojun looked into the situation of comprehensive utilization of bamboo resources in the Three Gorges Reservoir area which is rich in small-diameter bamboo. He discovered that, because of backward technology and with the exception of some traditional weaving usage, bamboos were being used at only 50 percent efficiency, which was a great waste of resources. To improve the utilization of the small-diameter bamboo, Liu Xiaojun organized sci-tech staff to do technical research and developed more than 20 patents for the use of small-diameter bamboo, raising the utilization ratio above 98 percent.

Aside from this focus, Liu Xiaojun also showed a keen interest in scrap materials generated by the production process. He organized his sci-tech personnel to conduct research and successfully combined bamboo sanding dust and leftover bamboo fragments with plastic to create “bamboo-plastic decorative molding” and a “new-style board.” It achieved the comprehensive utilization of resources and also brought the company greater economic benefits. It also helped bamboo timber processing enterprises to increase their revenue and reduce the solid waste discharges.

In the process of developing bamboo internal door sets, Liu Xiaojun was conscious of the need to establish bamboo production bases to ensure the sustainable exploitation of bamboo resources.

Under the leadership of Liu Xiaojun, the company ran its manufacturing enterprise and forestry industry simultaneously, forming an industrial chain comprising the market, enterprise, growing bases, and growers, while driving local economic development. Due to the low cost of growing bamboo which is undemanding in terms of fertilizer input and attendance, by growing 0.06 hectare of bamboo in the poor soil, a farmer household could clear an income of RMB600 a year. Therefore, beginning in 2000 and under the Three Gorges Project policy of “conserving soil and water and returning grain plots to forestry for ecological protection,” the company developed 13,200-ha bamboo production bases in more than 30 townships and towns such as Wenquan and Dajin in Kaixian County. Its annual bamboo output approached 300,000 tons, bringing additional income of RMB37.6 million to local farmers and saving 15 hectares of forest timber. It not only increased the farmers’ income but also ensured “green hills forever and sustainable utilization” of bamboo resources.

In many years of determined progress, Liu Xiaojun gradually developed his brand, which won a good market reputation. Since 2004, Special Star composite internal door sets have been listed among the top ten Chinese wooden doors for more than 10 years in succession. They qualified as China Environmental Labeling products,

and Protected Eco-Origin Products (PEOP) for China. In order to maximize use and exposure of the brand name, Liu Xiaojun prioritized sales of the internal door sets and led the company to establish more than 1,700 distribution outlets in 31 provinces (autonomous regions and municipalities), a network providing favorable conditions for the marketing of these products and establishing the company's domain with bamboo characteristics.

Cultural Envoys

In the 5,000-year continuum of Chinese civilization, bamboo has always been closely connected with people's clothing, food and shelter. Bamboo pens, bamboo paper, bamboo slips, bamboo poetry and bamboo musical instruments play an important part in the make-up of China's rich and profound culture. Today, as we enter the new era with ecological awareness, many Chinese bamboo artists feel it their mission and ideal to disseminate bamboo culture and build a beautiful China.

From time immemorial, groups of artists have played an influential role in developing and disseminating bamboo culture. Huang Yonggang, deputy director of the Chinese Bamboo Ink Painting Culture Association and a bamboo ink painting expert, fell in love with painting in childhood and now researches and creates modern bamboo painting based on the study of ancient works. Wu Xu, a Henan master of bamboo drawing, is whole-heartedly devoted to the study and creation of bamboo poem painting, presenting to contemporaries traditional Chinese bamboo poetry painting that "blends poetry with painting."

Wang Wei, head of Beijing Bamboo Orchestra, has not only developed over 30 bamboo musical instruments, but also founded the first Chinese bamboo orchestra, Beijing Bamboo Orchestra. They are popular at home and abroad. Numerous artists enrich their artistic aspect of life and display the splendor of bamboo culture to vast audiences. Among them are: Zeng Weiren, internationally-known master of arts, formerly a ship designer and now a designer of craft bamboo; Liu Jun, chairman of the Center for Urban Complex Design Research of Institute of Architectural Design and Research, Tsinghua University; Jeff Da-yu Shi, founder and chief creative officer of Beijing Dragonfly Cultural Development Co., Ltd.; Wang Gang, chief architect of Urban Element (Beijing) International Architectural Design Co., Ltd.; and Xia Xianchong, curator of Zhuyuntang Bamboo Carving Museum and bamboo carving connoisseur.

Among the cultural envoys are a great number of folk artisans: He Minwen, a Fujian inheritor of bamboo craft, was born into a family of bamboo craftsmen and started learning the craft from his father at the age of seven or eight, and by now he has crafted over 10,000 pieces; Yu Yunsheng, a villager of Dashu Township, Chun'an County, Hangzhou City, Zhejiang Province, is an out-of-the-ordinary bamboo craftsman; Li Wende, a villager from Xin'er Village, Huyuan Township, Fuyang City, inherited the traditional bamboo paper brand and production process, and founded Fuyang Dazhuyuan Bamboo Paper Co., Ltd. in Hangzhou. We were also deeply moved by Yuan Guanwen, an 85-year-old bamboo craftsman of Sichuan Province, Zhou Guixin, a folk artisan born in the 1970s in Dongyang City, Zhejiang Province, and Fang Miaoxin, a disabled bamboo engraver with great ambitions from Baizhang Town, Hangzhou City, Zhejiang Province, just to mention a few.

Whether cultural celebrities or folk artists, via their dedication to making bamboo and rattan cultural products, such people bring vitality to the development of bamboo industry, show to all their unique humanistic solicitude, and bring added beauty and color to the harmonious society and to the Chinese Dream.

An Ink Painting Artist's Love for Bamboo

Mr. Huang Yonggang, deputy director of the Chinese Bamboo Ink Painting Culture Association, bamboo ink painting specialist



Take one ink brush, one ink stone, and one piece of Xuan paper, and you have all the tools needed to express the charm of bamboo in a myriad of ways. It is perhaps true that no one in the world has such deep feelings for bamboo as the Chinese. Throughout history, bamboo has been an integral part of their life: in culture, architecture, music and many other aspects.

Foreigners may not totally understand why the Chinese love to paint bamboo so much. In painting bamboo, they are in fact creating a metaphor, extolling a person's qualities by alluding to the bamboo's integrity, elegance, and plainness. For thousands of years, countless poems and paintings expressing love and praise for bamboo have been written by Chinese poets. The renowned artist Huang Yonggang, deputy director of the Chinese Bamboo Ink Painting Culture Association, is among the many inheritors of bamboo culture.

To Depict Bamboo Is to Depict Life

Huang Yonggang is in his sixties. Looking back on his 40 years of painting bamboo, Huang likens it to bamboo, tenacious and indifferent to fame and fortune.

Even as a little boy, Huang loved to paint. His first teacher in the art of painting bamboo was Fu Songchuang, a well-known Chinese painter who was especially adept at bamboo ink painting. Huang recalls that he would often follow his teacher into the mountains in order to observe and paint the bamboos there, which were his first encounters with bamboo painting.

In 1982, Huang studied ink painting of bamboo systematically under the supervision of Professor Zhang Lichen, Ph.D. supervisor in the Central Academy of Fine Arts. There, Huang Yonggang learned the history of this genre and studied the features of paintings by major bamboo artists down the dynasties. This was a very formative period for his deeper understanding of bamboo painting and for

improving his skills.

Professor Zhang would tell his students, “To represent the living spirit of bamboo requires a high degree of spiritual concentration and highly honed skills. The bamboo that you see in your mind’s eye must be transmitted into your hand for the language of art to express nature itself.” Professor Zhang Lichen often took his students to the Palace Museum in the Forbidden City to lecture on the bamboo features in ancient flower and bird paintings. It was like being transported back into history and such instruction enhanced Huang’s love for this art and developed his sketching skills. His expressive techniques began to mature.

Such enlightened teaching from Fu Songchuang and Zhang Lichen gave Huang solid foundation in painting bamboo. Building on his study of ancient bamboo painting, Huang went on to study modern bamboo painting and developed the essence of bamboo painting connotations.

Huang has not had a smooth passage through life; there have been setbacks aplenty. But, referencing his work *Bamboos in Wind, in Rain, in Sunshine, and in Snow*, he likens painting bamboo to painting life, a process of perfecting one’s character and one’s work. He understands the true sense of why so many Chinese artists down the ages have loved to paint bamboo.

Huang Yonggang has dedicated 40 years of effort to painting bamboo. When you stand and look at one of his works you get a full sense of the spirit of bamboo. He compares life’s experiences with bamboos enduring wind, rain, snow and sunshine, and still gripping to life, like the bamboo in the famous poem by Zheng Banqiao: “Between broken rocks striking my root deep, / I bite the mountain green and won’t let go. / From whichever direction the winds leap, / I remain strong, though dealt many blows.” Huang’s art and his life are “ever bound up with bamboo, ever renewing and reemerging.”

No Set Patterns for Painting Bamboo

According to Huang, among all the world’s art forms, only the Chinese brush is capable of exactly expressing the qualities of bamboo. The Chinese brush can reproduce the appearance of the stem, the knots, the branches and the leaves of bamboo perfectly, in all weathers and all conditions. No other type of brush can perfectly deliver the appearance and spirit of bamboo.

According to Professor Zhao Ning’an, a specialist in flower-and-bird painting at the Central Academy of Fine Arts, Huang’s painting has the deceptively simple sense of freehand style that “cannot be achieved without lots of practice.” Liu Bingsen, a calligraphy master and vice chairman of the Chinese Calligraphy Association, said “Huang Yonggang’s landscapes, gardens and bamboos look natural and delicately beautiful.”

Bamboo has long been a favorite of Chinese painters and connoisseurs.

Calligraphers, poets, and writers could all dabble in bamboo painting. Huang says, “This illustrates the point that to paint bamboo is not too difficult, but it is certainly difficult to capture and reproduce the spirit of bamboo.” As the old Chinese saying goes, “It takes a lifetime to paint orchids but half a lifetime to paint bamboo.” Among the very many practitioners of bamboo painting, Huang has his own particular style; his bamboos exhibit elements of traditional Chinese ink painting and of modern sketching. He does not stick to a conventional style; his style is commendably his own.

Promoting Bamboo Culture

Bamboo culture is an essential element in Chinese culture. Bamboo arts such as bamboo painting and bamboo music are important parts of China’s traditional bamboo culture. According to Huang, “Without a deep understanding of Chinese culture and the Chinese character, you cannot feel the emotional symbolism implied in bamboo painting.”

Since time immemorial bamboo has symbolized the moral courage of the Chinese nation. It is a beautiful, useful, and auspicious plant. What delights the artist is that, along with advances in technology and progress in ideas, many breakthroughs in application have been made in bamboo, this carrier of culture. Bamboo farmers are getting rich, thanks to development of the bamboo root carving industry and the bamboo crafts industry. According to Huang, only when bamboo culture and bamboo industry combine can both of them thrive.

In his words, “Art is boundless. And there is no limit to my love for bamboo ink painting. To develop and pass down this ancient art, an art so redolent with meaning, we must learn from bamboo, effectively express its spirit, and use the language of art to praise its beauty and virtues.”

From Entrepreneur to Bamboo Carving Connoisseur



Mr. Xia Xianchong, curator of Zhuyuntang Bamboo Carving Museum

Not long ago, Zhuyuntang Bamboo Carving Museum opened without great fanfare in the Dayu Myth Garden, Hanyang River Strand, Hubei Province.

Over one hundred antique bamboo works are displayed in its 500 sq m exhibition hall: a paper knife engraved with a maxim, an armrest, an old lotus seedpod with about a movable nut, a gourd-shaped seal box with vermilion ink paste, and figures such as the legendary Eight Immortals and Four Heavenly Kings. All the tables, chairs and ornaments are fashioned from bamboo.

The 62-year-old curator Xia Xianchong was formerly a recording engineer in a film studio before changing direction, going into the cultural industry and falling in love with bamboo carving. Now, he has a collection numbering more than 2,000 items.

Obtaining a Treasure from a Hangzhou Collector

The descendants of Ming and Qing bamboo carving masters tend to congregate in the area of Jiangsu and Zhejiang, and this is a happy hunting ground for Xia Xianchong.

In 2004, a storekeeper in Hangzhou's Curio City introduced a 70-year-old professor to him. Chatting about bamboo carving, the two were like old friends. The old man sighed emotionally: "I didn't expect to find anyone who loves bamboo carving as much as I do. I've collected dozens of items over my lifetime, but, my two children don't have a scrap of interest in it. I'm getting old now, so I want to find a good home for them."

The two aficionados met a dozen times over the next eight years. In 2012, the old professor invited Xia Xianchong to his home and showed him his collection. Xia acquired from the old professor more than 10 bamboo carving works, including the precious *ruyi* scepter of auspice signed with the name Zhou Zhiyan, a master carver

of the Jiading School in the Qing Dynasty. “I can rest easy now that these things are in your hands,” said the professor.

It is no easy job to preserve bamboo carvings. Therefore, Xia Xianchong cleared an area of 100 sq m at home as a storeroom. He thought out all kinds of ways to protect the collection.

When pulling open the sitting room curtain, you saw a whole wall of vitrines on the main wall and over a hundred wood-framed glass cases on the ground. These small glass cases were originally used to contain precision instruments but were repurposed.

Xia Xianchong carefully studied the conditions needed to preserve bamboo carvings; he then had a cabinet air conditioner installed to keep the storeroom temperature at a stable 22°C. In addition, he positioned a few buckets of water to keep humidity at around 60 percent.

Appreciating Bamboo Carvings and Communicating with Ancient Literati

The world of bamboo carving collectors is not a crowded one, and there are still fewer researchers. Xia Xianchong began looking up information, making notes, and visiting museums in Beijing, Shanghai, Nanjing, Taipei, etc., to look at actual carvings.

Why is he so besotted with bamboo carving? Xia said: “Other antique works of art were created by craftsmen, but bamboo carving is different; it was created by amateurs, by literati. Refined scholars in ancient China were aloof and self-contained; so why did so many scholars during the Ming and Qing dynasties opt to work in bamboo, the least valuable of materials? Why this lifelong effort on creating these works? Because bamboo symbolizes a keen sense of integrity. By collecting bamboo carvings, I sense the feelings of the ancients, and learn how to be a man; this has also enlightened me on the management of my own business.”

He points to a smiling “Cloth-Bag Monk” and says to the reporter: “This is a piece created in the Ming Dynasty; the workmanship is simple and primitive, but it’s so animated. Doesn’t it look alive? Whenever I see it, I stand still and talk with it in my heart for a while.”

Future Aspirations

A few years ago, Leng Jun, a painter, looked at Xia Xianchong’s “treasures”; he examined one box after another, with great appreciation. He said: “It’s amazing that you have so many good things, but it’s such a pity to keep them at home; you’d do better to open a museum.”

Mr. Xie, a well-known collector and connoisseur of bamboo carving from Wuhan, visited Xia Xianchong and said: “You’re the leading collector of bamboo carving in

Wuhan, and you understand the humanistic spirit of bamboo carving. But ‘being enjoyed by one person’ is not as good as ‘being enjoyed by many’; if you open a museum, it will allow more people to feel the charm of traditional Chinese culture.”

Last year, on learning that Xia Xianchong wanted to open a non-profit public museum, the Wuhan City Water Services provided him a site on Hanyang River Strand free of charge. When experts on the preservation of cultural relics made an inspection visit to the museum, the curator of the Yangtze River Civilization Hall, Wu Hongtang, said: “It’s hard to believe a private museum could be so well ordered and professional, and hard to imagine a collector with such a deep love for bamboo culture.” The deputy curator of Hubei Provincial Museum, Wan Quanwen, said: “This private museum dedicated to carved bamboo is unique in China; it broadens our vision.”

Xia Xianchong has a new dream — that the museum could become a platform to develop creative cultural products and spread greater understanding and love of China’s bamboo culture.

A Life in Bamboo Culture

Mr. Lan Xiaoguang, chief engineer of Zhejiang Forestry Administration



Lan Xiaoguang is chief engineer in the Zhejiang Forestry Administration. His main role is in administrative management of the province's bamboo industry, but he is also a renowned figure in the field of bamboo culture.

An Innate Love of Bamboo Culture

Lan Xiaoguang began studying bamboo in depth during his third year at university. At that time, Zhejiang Forestry College (now Zhejiang Agriculture and Forestry University) selected 20 students from its Forestry Department for enrolment in a new department, the Bamboo Department. Lan was lucky enough to be among that first intake. He developed the habit of reflecting on bamboo-related issues whenever walking, running or standing on line, and recording those reflections every night before going to bed. This is his first dairy entry, dated December 25, 1980: "Passing thoughts deserve recording, even if they sound crazy. They might be of use one day."

After graduation, he stayed on to teach about bamboo growing. All the while, his interest in bamboo culture intensified, and he published a series of essays on ancient Chinese bamboo, cooking with bamboo, etc.

In 1991, Lan was transferred to Zhejiang Provincial Forestry Administration. Although the workload was very demanding, he never stopped his studies of bamboo culture. For decades, he spent most of his available time studying ancient Chinese bamboo culture and writing papers.

On May 17, 2016, he went on a research visit to Shengzhou Bamboo Factory. The formerly prosperous plant was practically deserted; there were just seven craftsmanship inheritors, with a mean age of over 70. Yuan Yaqin, the only state-level inheritor of bamboo craftsmanship in Shengzhou, pointed to photographs of two art treasures, a bamboo eagle and a bamboo horse. The former had been presented to the United Nations by President Deng Xiaoping; the latter had been praised by

President Jiang Zemin. She kept telling him: “All the bamboo craft objects here are our children. The blood, sweat and tears of innumerable hand workers went into their making.”

These moving words made a deep impression on Lan Xiaoguang, making him even more aware of his great responsibility. He shared a message on WeChat: The exquisitely fashioned “children” produced by our bamboo and wood craftsmen will star on the stage of China, on the world’s stage even!

A Prolific Publisher

After thorough research, Lan Xiaoguang basically clarified the threads of Chinese bamboo culture. He outlined its systemic theory and produced nearly a hundred academic papers. He made four major contributions to bamboo culture studies.

In his book *Understanding Bamboo Through Writing*, he presented an overall framework of Chinese bamboo culture through an examination of 10 Chinese characters containing the radical element referencing bamboo.

His book *Ancient China from Jian Bamboo Slips* discusses the geographical distribution of bamboo culture. Based on information on excavated *jian* bamboo slips, he proposed the “four districts and two roads,” the four districts being Qi Garden, Chu State, Kuaiji and Yelang Kingdom, and the two roads being the ancient Silk Road and the travel route of Xu Xiake, a Ming Dynasty travel writer and geographer.

In *Looking at China Through a Bamboo Tube*, he took a chronological approach, summarizing bamboo culture at different periods of time. He posits seven periods of bamboo civilization, cooking with bamboo, bamboo archery weapons, bamboo weaving, bamboo slips for writing, bamboo musical instruments, bamboo spirit, and bamboo technology. This book also covers bamboo studies in six bamboo culture museums, namely the Liangzhu Museum, the ancient Tonglu Mountain Copper Mine Site in Daye, the Mawangdui Han Tomb in the Hunan Provincial Museum, Dunhuang Museum, Yinqueshan Han Tombs Bamboo Slips Museum in Shandong Province and the Palace Museums in Beijing and Taipei.

Chinese Inventions on Bamboo summarizes and describes ancient Chinese inventions and creations involving bamboo. It showcases tangible and intangible cultural heritages above the provincial level. He lists 20 bamboo-related inventions of Chinese origin: firecrackers, kites, lanterns, bamboo dragonflies, bamboo rafts, chopsticks, ink paintings of bamboo, flutes, the *sheng* (a wind instrument), bows and arrows, the fire lance, gunpowder whip-arrows, the water fire-dragon (an ancient Chinese rocket launched from a floating site), the flying sand barrel (a recoverable rocket), the *zhuotong* well (deep, small-mouthed salt well), bamboo houses, bamboo carving, bamboo slips for writing, Diabolo game and the bamboo garden.

In his spare time and when opportunities arise on business trips, he dashes off to

a library to research and make copies of material. On his return, to deal with the vast amounts of information gathered, he classifies and puts it into a research framework. His passion, dedication, and professionalism have yielded a rich harvest.

Pushing for Development of Bamboo Culture

Lan Xiaoguang is concerned with linking theory with practice. In the transformation and upgrading of traditional bamboo industry, he sees the Internet as the platform, bamboo culture as the core and innovation as the vehicle.

He believes that, propelled by the Internet and bamboo culture, the traditional bamboo industry is about to enjoy a renaissance. He was among the earliest teachers in the forestry discipline to see the great importance of e-commerce for bamboo and wood products, and is one of the main lecturers teaching Forestry E-commerce in the State Forestry Administration.

Lan Xiaoguang tirelessly explores how to transform bamboo culture into a practical productive force. He put forward the e-commerce model in the bamboo industry. In his view, to achieve the transformation and upgrading of China's bamboo industry, improving the value-added products should be the focus of work and the Internet platform should support bamboo culture. He proposes spreading the bamboo message by firmly sticking to the integrated "product, story, and ecology" concept. He also favors using the C2B electronic business model to promote individualized designs for bamboo products.

Lan Xiaoguang is due to retire in 2017. But he says his bamboo culture mission is only just beginning.

From Jewelry Designer to Ambassador for Bamboo Culture



Mr. Jeff Da-yu Shi, founder and chief creative officer of the Dragonfly Design Center

He is an unconventional man. He used to be a jewelry designer, using the world's most expensive materials in his creations, but now he makes furniture with bamboo, one of the most common materials found. Living in self-imposed obscurity in the world of design, and speaking only through his works, not through his voice, he is passionate about bamboo as a material that symbolizes the Chinese spirit, and studies it as a lifetime cause. His go-it-alone nature has made his name virtually synonymous with Chinese bamboo culture. He is Jeff Da-yu Shi, a famous designer and the founder and chief creative officer of the Dragonfly Design Center.

For Him Bamboo Is the Representative Material of Chinese Culture

Shi spent the greater part of his childhood with his maternal grandmother in Xinzhu, Taiwan, an area rich in bamboo. He and his play mates played with bamboo toys, so he has been interested in bamboo from a very early age.

In 1996, Shi returned to Taiwan from the United States and set up the Dragonfly Gallery of furniture and accessories. As a professional buyer he toured the Western design market, and introduced brands and works from the world's cutting-edge design teams into the Dragonfly store in Taiwan.

He says that while doing business with Europeans and Americans he found a lack of original contemporary designs from China to represent her culture. He felt it necessary to develop a design conception that would pertain to the way of thinking in traditional Chinese culture. From the art forms he has seen in Taiwan, such as glass, wood, ceramics, lacquer ware, indigo batik, and cross stitch, bamboo is the most valuable and most interesting.

“Bamboo is the material of the future. It's environmentally friendly and is a traditional Chinese material. The West does not have it. We used to excel in ceramics but we now lag behind Japan and Germany in this. But the West has no material or

technology corresponding to bamboo and so I have a soft spot for it.”

Shi's reflections on design and what he does with bamboo material have attracted attention at home and abroad. He has been described in Taiwan's media as the first person to “make the fading bamboo industry shine bright again.”

His Use of Bamboo Lights Up the International Design Stage

Through history, China's literati and recluses have loved bamboo.

In 2015, during the Beijing International Design Week, more than 5,000 canes of green bamboo, between three and six meters in height, transformed the South Square of the China Millennium Monument into a design square with the theme “Dream of Bamboo.” China's top ten architects used bamboo cubes as the basic construction unit and, through the introduction of new creative materials, built devices with diverse functions scattered about in the bamboo forest, displaying a maze-like bamboo world from which visitors could hardly tear themselves away.

At the same time, an elegant and austere Bamboo Living Home was presented in the theater of the Ullens Center for Contemporary Art where Shi was holding a design exhibition on the theme of “tea, bamboo, and music.” Its latest living room series, study series, tea room series and *Gugin* room series continued exploring the potential of bamboo as a future-orientated and environment-friendly material in contemporary Chinese design and process technology. This was the fifth year of participation by Shi and his Dragonfly Design Center in this international design event held at UCCA in autumn following the Beijing International Design Week.

Using bamboo as material, each of Shi's designs reaches out beyond beautiful appearance to make a technological breakthrough. In every R&D attempt he always explores the properties and limits of bamboo in the production process so as to mine the potential of bamboo and enhance its value.

Take for example the “Chair Youxian,” a rocking chair exhibited for the first time in 2015. Drawing on the Chinese ideal of the unity of heaven and earth as his design principle, and conforming to the harmonious relationship between man and the environment, Shi used bamboos grown in Chinese soil for five to seven years and felled between the Mid-Autumn Festival and the Spring Festival, suiting technology and processes to the properties of the bamboo in question. He gave thought to ways of transforming the beauty of traditional bamboo weaving into modern design language and using breakthrough technology (overcoming the problem of bamboo twisting sideways) to realize the possibility of bamboo slats bending in all directions. A masterpiece was born that combined superb skills and the beauty of traditional crafts.

His design influence has inspired advances in production processes and technologies. He has garnered awards in international design arenas and drawn world attention to excellent Chinese original design. He was awarded the title

“Chinese Culture Icon” by the Chinese Culture Promotion Society, and his “Chair Youxian” won a Special Mention in the 2017 German Design Awards.

His Aspiration: To Benefit Bamboo Farmers and Promote the Development of the Bamboo Industry

Over the years, exploring the ultimate potential of bamboo as an eco-friendly material in design and craftsmanship has remained Shi’s major focus. He champions the wide cultivation of bamboo, and makes genuine efforts to promote the revitalization and development of the bamboo industry in order to help Chinese growers.

Some business insiders hold the view that the current Chinese market offers little hope of bamboo occupying the high-end consumer market. Shi, by contrast, contends that, despite bamboo being a cheap and common material, when combined with excellent design and workmanship it can fetch a high price, like jewelry. He cites the case of Japan, where bamboo handicrafts rival big and famous brands in price. A lady’s bamboo purse can be sold at 250,000 Japanese yen. Moreover, if the workmanship is right, bamboo handicrafts can last 200 years.

China is the world’s largest producer of bamboo. Shi says: “My use of bamboo in design is not to make something beautiful but to bring it to the notice of more people. Behind bamboo as a material is an entire bamboo industry; behind the bamboo industry are the bamboo growers. Would there be any bamboo material if no one planted bamboo? That’s why I have been trying to help the industry prosper, so as to create a bigger market for bamboo as a material and incentivize more people to plant bamboo.”

Shi hopes that there will be great prospects in future for high value-added bamboo composite materials.

Curator of the International Bamboo Architecture Biennale

Mr. Ge Qiantao, a well-known Shanghai artist, curator, and visiting professor of Guangzhou Academy of Fine Arts



Xitou is a remote mountain village in the jurisdiction of Baoxi Township, Longquan City in the south of Jiangxi Province, adjacent to Fujian. In a move that stunned the world of architects and bamboo researchers, it was the spot chosen for an International Bamboo Architecture Biennale by Ge Qiantao, a well-known Shanghai artist, curator, and visiting professor of Guangzhou Academy of Fine Arts.

Bamboo Architecture Integrated into Local Culture

The idea of holding an International Bamboo Architecture Biennale occurred to Ge in 2009. He had made countless visits to architecture and arts biennales in many cities. In his opinion, such biennales were characterized by conceptualization, all the exhibits being enclosed and “boxed” inside buildings rather than localized, which rendered their academic value abstract and indistinct.

He racked his brains about how this situation could change; having discussed the matter with the architect Yang Xu, he designed buildings “grounded” into the village setting, using the natural medium of bamboo. In contrast with the changing themes of standard biennales, the bamboo architecture biennale was integrated from the outset into the cultural and physical environment of its rural setting.

Ge and the villagers strived to blend the design and the local life, working together to build a bewitching bamboo world. Today, the completed community of bamboo architecture throbs with life, withstanding the tests of time and natural changes, a community rich in local culture, one that embodies the interaction of man and nature, of man and architecture, of man and environment.

Severe Challenges Along the Way

Turning an idea into reality means challenges at every turn.

Shanghai is some 500 km distant from Longquan, which is 64 km distant from

Xitou. To drive from Shanghai to Xitou takes about nine and a half hours. In the four years before the biennale, Ge made more than a hundred round trips. The mountainous road between Longquan and Baoxi was bumpy, narrow and twisting. Passengers could expect motion sickness. With every bout of rain the road got slippery and dangerous to drive on but, even in these conditions, Ge always kept on going.

More difficult than the journey was the challenge of convincing locals of the richness of bamboo culture. The constraints of their physical environment cramped their mindset somewhat and they saw bamboo merely as a material for scaffolding, chicken sheds and chopsticks; they simply could not see the point of creating bamboo architecture and holding a biennale. Ge tried patiently to persuade the villagers and village officials that it had a bright future, but there was a dearth of successful cases to point to as examples. He believed that doubt is quite normal when it comes to innovation and creation, but he was positive that time would prove him right.

With most international biennales, once they close the exhibits are dismantled and removed. However, the local authorities wished to keep all the bamboo buildings standing. This gave Ge the challenge of making the biennale bamboo buildings truly blend with the local environment.

The most important thing in rural construction is finding a sustainable development path, i.e. an integrative link between the past and the future. Baoxi Township produces a wealth of bamboo, which is an important medium for Ge's team to get involved in rural construction and echoes the mutual understanding and spiritual linkage joining Ge's team and the architects, constructors and indigenous peoples.

Reshaping the Allure of the Bamboo Homeland

After much toing and froing, many prominent architects from around the world completed their bamboo buildings in Baoxi for the architecture biennale. Baoxi's alluring bamboo realm was now there for the whole world to see.

The International Bamboo Architecture Biennale gave 11 internationally renowned architects from eight countries the opportunity to design and jointly build a contemporary Chinese village. It attracted visitors including architects, designers and university teachers and students during the course of construction, and during the National Day holidays following the biennale's opening ceremony, there were over 10,000 visitors daily. The biennale is an ongoing two-yearly event, run by a professional team.

In 2016, Ge invited INBAR (International Network for Bamboo and Rattan) to co-sponsor the inaugural biennale. INBAR's Global Bamboo Construction Project coordinator Liu Kewei commented, "This biennale of Mr. Ge's making will have a special and enduring role to play in the development of bamboo architecture and in

technological and cultural exchanges, not just among INBAR members but over the whole world.”

In terms of form and content alike, the localized bamboo architecture biennale at Baoxi overturns the concept-themed exhibition model and the city-centric biennale form. It is adaptive to the local environment, sourcing materials from the surroundings. The process of understanding the sense of place, sorting, distilling and designing has brought local people to a new understanding of their own culture.

Professor Ruan Yisan of the College of Architecture and Urban Planning of Tongji University had high praise for the bamboo architecture biennale, describing its impact as boundless. “The diversity of vistas has created an amazing realm of art, albeit one with close links to daily life. And this is where its strong appeal lies.”

The biennale, a fenceless “community of bamboo architecture,” flows into and interacts with the traditional-style village beyond the stream. It is a place where history and culture, modernity and tradition, fashion and rusticity converge. The settlement form of this creative village is now a magnet for visitors from all over the world, for study visits, sightseeing and creative residency.

Inheritor of Traditional Bamboo Papermaking

Mr. Li Wende, representative inheritor of intangible cultural heritage (bamboo paper making) in Hangzhou



Papermaking is among the Four Great Inventions of ancient China, an important technology that advanced the development of human civilization. It has been passed down successive generations for more than 2,000 years. When Cai Lun invented the papermaking process, his raw materials were tree bark and hemp; during the Jin Dynasty (265-420), bamboo started being used to make paper.

Fuyang City, under the jurisdiction of Hangzhou in Zhejiang Province, is known as the “hometown of handmade paper.” Since the Southern Song Dynasty (1127-1279), its bamboo papermaking skills have been handed down from generation to generation for over 1,000 years. Li Wende, a farmer from Xin'er Village, Huyuan Township, Fuyang City, inheriting the traditional bamboo paper brand and the making process, founded Hangzhou Fuyang Dazhuyuan Bamboo Paper Co., Ltd. to produce and sell bamboo paper, making a unique contribution to the development of bamboo paper in Fuyang.

A Childhood Surrounded by Bamboo Papermaking

Bamboo paper is fragrant, as thin as a cicada's wings and as flexible as silk fabric. Its dense fiber structure means it takes ink readily without it running, and can be stored for long periods without pest damage. These great advantages make bamboo paper a top product, one that has been favored by the literati since ancient times.

When Li Wende was a child, his family used to make paper used for calligraphy and sacrificial ceremonies, but he was never allowed to touch the precious calligraphy paper. So, he did a lot of work helping make votive paper. In the evening after their busy daily work, his parents would often bring back a stack of sun-dried handmade paper. Then, the parents and children would work together separating the sheets in a process called “paper tearing.” Silently and unobserved, the various steps involved in papermaking seeped into Li's early life.

At that time, the wealth of a papermaking household could be estimated by the number of troughs it had. When the household contract responsibility system was implemented, his family had two troughs, handling about 100,000 kg of bamboo materials annually, with at least six people working around the troughs. In addition, Li Wende helped out in bamboo cutting, the first step of the papermaking process. At the age of 14, Li started work with his brother at six every morning, spending over an hour pounding the materials.

At the age of 16, Li formally apprenticed himself to his first teacher, a local papermaker in his village. Later, he followed a master craftsman, spending a year learning the finer points of the craft. As a result, he mastered all the skills of the papermaking process.

A Change of Direction in Shanghai

In 1990, Li Wende took over his parents' business and established the Ade Bamboo Paper Workshop. Producing paper in a mountain village far away from the city, absorbed in fine craftsmanship, he did not concern himself with sales; life was pretty comfortable. But in 2007, he was hit by the financial crisis. The price for one roll (4,800 sheets) of paper more than halved, falling from RMB280 to 120, which failed even to cover costs. Therefore, Li Dewen had to seek markets further afield.

In Shanghai, Li met a man who had retired from the cultural center. Li called him "Teacher Ye." Ye told Li he should sell his bamboo paper to painting and calligraphy teachers at cultural markets and specialist stores. He should also take a look at trade fairs, where he was likely to find his target consumers.

This visit to Shanghai gave Li a new understanding of bamboo calligraphy paper. He returned to the fray with his confidence strengthened, putting heart and soul into producing and promoting his paper as a cultural product.

Strengthening Confidence and Struggling to Develop Business

On May 20, 2006, the State Council approved the listing of bamboo paper making in the first batch of national intangible cultural heritage. Bamboo paper produced in Sichuan Province's Jiajiang County and Zhejiang Province's Fuyang City are the most famous and popular.

In those years, Li Wende participated in various cultural goods fairs and arts and crafts fairs all over China, and attended seven fairs in a single year. Thanks to such participation, he received orders from Taiwan, South Korea and Japan.

Having broken into the market, Li Wende's paper business grew larger and larger. In 2009, he turned his paper workshop into a company. Li's papermaking workshop was made a demonstration base of intangible cultural heritage in Hangzhou. Moreover, his registered Fuyang Dazhuyuan Xuan Paper Co., Ltd. was listed in the "fourth batch of time-honored brands in Zhejiang Province" in early 2017, and

“Dazhuyuan” was designated as a well-known trademark of Fuyang City.

His company has an online store on the e-commerce platform Taobao. This “Dazhuyuan Xuan Paper” store does not produce huge volumes of network sales, but it is a highly trusted enterprise.

In 2015, Li Wende was named a representative inheritor of intangible cultural heritage of bamboo paper making in Hangzhou, and was elected vice-chairman of the Fuyang Bamboo Paper Protection and Development Association.

Founder of the World Renowned Bamboo Orchestra

Mr. Wang Wei, head of the Beijing Bamboo Orchestra



Wang Wei is an artist who has given himself to the study of bamboo music for over 20 years. He has not only innovated more than 30 bamboo instruments, but has also established China's first bamboo orchestra — Beijing Bamboo Orchestra, of which he is the head.

In 1995, Wang Wei published a paper “Playing Bamboo Music of the Chinese Nation — on the Construction of a National Orchestra” in the authoritative magazine *People's Music* where he wrote: “For many years, I've been eager to establish a bamboo band with Chinese national features, a desire that can be attributed not only to my special love for bamboo, but also to the broad prospect of research and development of new musical instruments, because bamboo music has a long history in China and there is a great variety of bamboo instruments.” The article drew an unexpectedly strong response from experts in the music industry, and as a result, a special conference was convened for the creation of a bamboo band. The 30-plus musicians who attended, including Vice President Qin Pengzhang and Vice-Chairman Zhao Feng of the Chinese Musicians' Association, unanimously agreed that a bamboo orchestra was both feasible and promising.

However, the first requirement of establishing the orchestra was to invent a batch of new bamboo instruments, each with different timbre and register. This would be a very tall order for Wang, who had neither the money nor the expertise needed.

But he would not abandon his dream. Looking for the right bamboo and making bamboo instruments became part of his daily life. He spent all his savings, lost his job and even paid in his own blood when, due to exhaustion, he lost half the middle finger of his left hand while working on bamboo. It left him with the life-long regret of no longer being able to play freely.

His hard work eventually paid off. A bamboo percussion board of his invention came into being. The instrument has a sweet mellow timbre, making up for the lack

of Chinese folk instruments of plate like melody percussion; then we saw the return of the *Xiang*, an ancient bass instrument lost for 1,000 years, making up for the lack of bass melody among Chinese folk instruments; there was even an instrument from bamboo charcoal, kiln-fired at over 1,000°C, and capable of producing a metallic sound. Since then, bamboo instruments came out one after another, over 30 types in all. They cover the whole register — treble, tenor, and bass; they can be blown, struck, plucked and bowed, and have a range wider than that of ordinary pianos.

A bamboo orchestra was finally established, but an actual performance was still a long way off. “Whereas other musical instruments have sample pieces to follow, playing bamboo instruments is quite different; every item needs arranging from new — an unimaginable task,” Wang Wei said.

To his great relief, one friend after another offered help. Composers Mo Fan and Yang Yidan traveled long distances to check out the bamboo instruments, and soon produced the sextet *Xiaoxiang Bamboo Shadow* and the Dai ethnic music *Xiao Bushao*. Composer Chen Wai created a series of works, including *Green Bamboo Around the Capital*. The current repertoire encompasses traditional Chinese folk music and universally loved world famous pieces.

On hearing the beautiful sounds of the instruments in performance, no one in the audience could fail to be moved by the sounds of nature. The former director-general of INBAR Ian Hunter said, “The Bamboo Orchestra has a wide range and mellow timbre, producing a natural and pleasant sound. It is unique, totally different from other types of orchestra. People who attended your performance expressed amazement at the creation of an orchestra playing on bamboo instruments.”

During the Spring Festival this year, the Beijing Bamboo Orchestra went to the United States at the invitation of Minnesota State and representing the Ministry of Culture. There it presented a New Year concert named “The Charm of Chinese Bamboo Music” to an audience of Chinese and Americans. The program included the most popular Chinese folk songs, world-famous pieces and new arrangements of traditional American folk music and movie music. Some local media praised the performance highly, describing it as a perfect combination of traditional Chinese culture and green ecological culture.

Right from the outset, the orchestra took ecological protection as an important responsibility. Every instrument is made from bamboo, and many of its performed pieces have an ecological theme. On green days such as World Environment Day, Beijing Bamboo Orchestra endeavors to create a concert program that integrates interest, knowledge, culture and environmental protection.

In Wang Wei’s view, “A concert should keep up with the world trend, raise people’s aesthetic appreciation. In addition, it should cater to both refined and popular tastes, encouraging public participation.” Therefore, before each performance, Wang Wei gives an introduction on bamboo culture and bamboo instruments. At the interval,

one lucky audience member is selected for an unforgettable interactive experience, being invited on stage to play a bamboo instrument. Following Wang Wei's demonstration, within just a few minutes, they are able to play a simple and sweet piece together.

In the last few years, both in China and overseas, Beijing Bamboo Orchestra has given many special concerts on these unique bamboo instruments. Its influence has grown steadily. Its book *The World of Bamboo Music Instruments* has been selected as an "International Publishing Project of Classic China" and is in the collection of the U.S. Library of Congress. In the China Golden Disc Award, the orchestra's recordings of *Bamboo Chant* and *Bamboo Flower* won, respectively, the prize for best record and nomination for the best instrumental album.

Like spring bamboo shoots emerging after rain, Wang Wei and his bamboo orchestra keep on studying, innovating and enriching China's world of bamboo music, and spreading China's bamboo culture.

Life Lessons from Bamboo

Mr. Chen Guoping, principal of Duishi Primary School,
Zhejiang Province



Duishi Primary School, located in Tianmushan Town of Lin'an City, Zhejiang Province, is a remote village school. This being the case, how could it attract foreign visitors from over 40 countries? How could it catch the attention of more than 10 provincial media?

The school's principal, Chen Guoping, has a one-word answer — bamboo. Duishi Primary School has become a model of bamboo culture education for China and the world.

Local Kids Know That Bamboo Feeds Them

Duishi Primary School has hosted four groups of foreign visitors, most recently on September 9, 2014. On that day, more than 20 international friends from 15 INBAR (International Network for Bamboo and Rattan) member countries such as Brazil, Cameroon and Mozambique visited the school, where they were warmly welcomed by the teachers and pupils. They were highly excited to visit the beautiful village school campus overflowing with bamboo decorations. They had high praise for the bamboo culture corridor and visited the bamboo culture exhibition rooms, practice rooms and the bamboo species garden called “Green Bamboo.” They watched the pupils perform “Bamboo Hat Dance” and “Bamboo Pole Dance” on the playground and even joined in the dancing. Applause and laughter filled the school grounds.

Scenes like this make Chen Guoping feel particularly happy because bamboo culture education gives the children wider platforms and expands their horizons.

Why do they choose to make bamboo culture the core culture of the school?

Lin'an is a major bamboo growing area in China. Of its 530,000 population, some 130,000 do jobs related to bamboo and bamboo shoots, and the total output value exceeds RMB3 billion. Chen Guoping said, “The living costs of many students in our school are covered by bamboo. Learning about bamboo, knowing bamboo and

thanking bamboo equates to being grateful to parents and this land. Truly, when you drink water you must remember the source.”

In Duishi Primary School, bamboo culture education is absolutely not an empty slogan, but is deeply integrated into the school’s teaching activities and management.

In the second half of 2012, Duishi Primary School started to write and compile teaching materials on bamboo culture Information Reader. In February 2014, they revised six books of the *Green Bamboo* series. Chen Guoping said, “It was a really difficult process. Our teachers spent their free time searching and reading massive amounts of material to decide on the structure and select the content of the textbooks, and developing the relevant video materials and teachers’ books.” Recalling that detailed exploration, Chen said, “It was difficult, really difficult. But it was exciting too.”

The school’s bamboo culture courses are closely linked with teaching activities and held every two weeks. The bamboo culture teaching combined with knowledge contests and exhibitions is conducted in lively fashion.

Learning Through Play Helps Open Minds

Bamboo is a part of life for the people here. In the school, a series of practical activities relating to bamboo is conducted, so, from an early age, children start learning about bamboo, loving it, using it and playing with it.

The school boasts a Green Bamboo Garden, which has some 20 different rare species and 1,230 bamboos in all, every one of them planted by the teachers and pupils. This green bamboo forest has witnessed the primary school pupils growing up and the enlightenment and development of Chinese bamboo culture education.

Every pupil is required to master “three skills.” This means each of them can “play at least one bamboo-made musical instrument,” “perform at least one bamboo dance,” and “make at least one kind of bamboo handicraft.” The school offers many kinds of social events: the characteristic bamboo dance, beloved of all the pupils; bamboo carving which focuses on cultivating manual dexterity; bamboo crafts to bring imagination into play; and bamboo exploration to gain practical knowledge about bamboo through such activities as bamboo cultivation. Every year, the school holds a bamboo culture and art festival. During that period, some pupils perform the bamboo dance, some play bamboo flute and cucurbit flute. At the Primary and Middle School Students Art Festival of Lin’an their bamboo dance took second prize. It has also been performed in the culture halls of nearby villages, at Zhejiang Agriculture and Forestry University and during performance tours of Zhejiang TV. Every year, the school hosts a “bamboo sports meet,” at which almost all the equipment used is made of bamboo.

Hands-on Learning to Pass on the Spirit

The campus spirit, consisting of “modesty, strong will, progress and contribution,” is built around the spirit of bamboo, and is spread and developed among all the teachers and students. According to Chen Guoping, inheriting bamboo culture and appreciating the bamboo spirit helps children to learn and spread the spirit of bamboo, one of elegant appearance, peaceful inner life, and freedom from vulgarity.

Thanks to bamboo, Duishi Primary School has risen from being a humble rural primary school to a shining star of bamboo culture education in China and even in the world.

Zhang Xiangshu, counselor of Ecological Development Union International and environmental scientist of the Renmin University of China, commented, “It is no simple thing for a rural primary school to offer school-based courses with locally available resources, to lead the pupils to study bamboo culture, and to develop environmental education. And to achieve such great results in just one year is very commendable.”

Chen Guoping has always felt it his duty to conduct bamboo culture education on this land of bamboo. He said, “By using bamboo, we build the brand, connect to the world, introduce resources and create specialty. We hope the traditional bamboo culture of China will take root in the children’s hearts, where it can sprout and grow vigorously.”

Smart Design Brings Magic to Bamboo Furniture

Mr. Zhu Liqun, founder and art director of "Bamboo Belief"



Zhu Liqun majored in Chinese language and culture at university but he has worked in interior, graphic and furniture design since graduating over 20 years ago.

In 2015, his work *Seven Sages of the Bamboo Grove* (seven items of bamboo furniture) was making the news for winning the “design world’s Golden Horse Award” in the 2015 Golden Pin Design Award of Taiwan. In 2013, this work won the highest status Special Award in the Great China Cup Cross-Straits Ming-style Furniture Competition.

Bamboo grows in abundance in Quzhou, Zhu Liqun’s hometown. In his life, bamboo products were everywhere to be seen but they were small, commonplace things like chopsticks, summer sleeping mats, chopping boards, teacup mats and window blinds. Thanks to technological advances, furniture made from bamboo has rapidly become a rising star of the low-carbon industry. He soon learned of a process that could produce bamboo material every bit as strong as forest timber. Bamboo is first split, then carbonized, baked and pressed or molded, finishing up with scrimber that will remain insect-free for 30 years. It is light and tough, elastic and hard; its non-splitting and non-deforming properties are way superior to those of wood.

Since bamboo can be applied so widely, the possibility of using it for furniture instead of wood occurred to him. “I grew up in a community surrounded by bamboo, so it has a special place in my heart. A four-year-old bamboo is ready for felling and for use in the furniture industry, whereas wooden furniture entails the felling of great numbers of trees, great swathes of forests. Following the government’s actions to preserve forest resources, bamboo will have great market potential in furniture manufacturing,” he predicted.

In 2010, Zhu Liqun established Hangzhou Milan Image Decoration Co., Ltd. His “Bamboo Belief” bamboo lamps, making their debut in the third National Forestry Exhibition, won a High Quality Product award and were highly thought of by buyers

and traders. In September 2013, the “Bamboo Belief” Bamboo Culture Furniture Experience Hall opened in Shanghai. In December, his “Yashi Sofa” was nominated for the China Good Design Award. In December 2014, his “Flowers and Zen” took top honors in the China Good Design Award.

As well as winning awards by the score, “Bamboo Belief” brand furniture has won approval in the high-end furniture market.

Critics have described Zhu’s works as pleasingly simple but striking, classic with a twist, controlled yet free, tranquil and elegant. What they demonstrate is a combination of traditional esthetic refinement and the comfort of the modern lifestyle.

Zhou thinks the designers must have a great sense of social responsibility and sense of mission. To his mind, given the severe impact of human activities on the global environment, it has become important to mine the design ideas inherent in the Chinese philosophy of man and nature in unity, and traditional Chinese esthetics.

He elaborates: “How to make our cities more beautiful? These days, we don’t lack advanced technology or skills, but our design concepts are a mess. Low-carbon and green living can’t be technology-dependent. Only by using simpler materials combined with design intelligence can the potential of design be deployed for a low-carbon economy.”

Why choose bamboo?

According to Zhu, “The material used is the spirit of furniture design.” Material for low-carbon furniture first and foremost has to be green and environment-friendly, preferably natural material. Bamboo and rattan meet these criteria best, in particular bamboo. A fast-growing renewable resource, bamboo helps to save forests.

“Our people have long loved bamboo. Tough and upright, bamboo has always symbolized grace, simplicity, modesty and integrity. It is part of our traditional value system. On top of its noble connotations, it is amazingly practical in modern life.” Zhu Liqun, steeped in Chinese culture, is happy to explain.

Mr. Zhu inherited the spirit of craftsmanship. Refinement, environment-friendliness and humanity imbue each and everyone his “Bamboo Belief” furniture pieces. He prefers to make original pieces rather than reproductions. Using bamboo glulam and bamboo scrimber as raw material, he produces his “Bamboo Belief” furniture by steaming, washing, anti-pest treatment and high-temperature baking. He exploits their excellent performance features and the finished products benefit from being fine-grained, lustrous and bug-resistant.

Zhu has been described as a low-carbon-fixated designer of bamboo furniture. He himself says, “Low-carbon is a kind of attitude to life. I just hope my designs stimulate awareness of the environment and create more interest in our glorious traditional culture.”

An Artist Engraver of Ancient Script on Bamboo

Mr. Chen Zhixian, a master craftsman of bamboo engraving



Bamboo engraving is a specialized craft unique to China, one that dates back to the Shang Dynasty (c. 1600-1046 BC). Craftsmen use Moso bamboo and hard, pointed tip gravers to inscribe words or patterns. Chen Zhixian, a villager from Longmen, Fuyang District, Hangzhou, has been conferred with the titles Representative Inheritor of Intangible Cultural Heritage in Bamboo Engraving Techniques of Fuyang District and Hangzhou Master of Folk Arts and Crafts.

Bamboo Engraving: a Blend of Technique and Art

Chen Zhixian, now 55, developed a love of bamboo engraving from his father Chen Yongxian, himself a practitioner. As well as learning from his father's techniques, Chen Junior developed them further and has won himself national recognition as a bamboo craftsman.

He is particular about his choice of raw materials: "For a good piece of work, you have to select the right bamboo. Old bamboos are dense, and engraved old bamboos are less likely to deform. They look nice after being rubbed down." He tends to seek out and cut his bamboos in the early morning, before the dew has formed. He will lick the first cut bamboos with his tongue, tasting for the bitterness that deters grubs. Passed down from old bamboo craftsmen, such tricks of the trade are still cherished and used today.

Bamboo engraving is a combination of technique and art. The technical skills are readily mastered, but the art is a different matter. This is totally dependent on an individual's sensitivity and overall quality, a combination that is hard to define in words. It is a complicated, time-consuming art that demands high skills and labor input, factors that deter the average person from learning the craft.

Chen's Passion for Pre-Qin Bronze Inscriptions

Against the backdrop of the Cultural Revolution (1966-1976), Chen left formal education at the age of 14, and instead began to learn bamboo engraving under his father. However, in 2014, Chen, who did not even graduate from middle school, nevertheless started studying ancient Jin inscriptions of the Zhou Dynasty period (1046-256 BC).

Jin script flourished during the Zhou Dynasty. It was a mixture of hieroglyphic images and writing that developed gradually into *dazhuan* seal script. It was engraved on Yin and Zhou bronzes, hence its alternative name, "bronze script."

"Once, I attended a lecture of a professor at China Academy of Art. He said the inheritance of intangible cultural heritage needs development and innovation, and this inspired me. Then it occurred to me that by engraving Jin script onto bamboo I could combine my two passions. But I haven't made much money from it yet, and I'm getting on in years, my memory's not getting any better, not to mention studying, researching, and sorting out before I can get around to the engraving itself.... Even so, it's what I enjoy doing," says Chen.

Although the inscriptions on bones or tortoise shells of the Shang Dynasty have received great attention from scholars, there are not so many studying Jin inscriptions so there is no specialist academic discipline. Since seeing Jin inscriptions for the first time, Chen had wanted to learn about them and engrave his modern versions of them onto bamboo. With the help of a number of enthusiastic Tsinghua University professors, he collected and sorted out Jin inscriptions and translated them into modern vernacular Chinese. After three months' effort, he completed his first work, a brush holder with bilingual Jin and modern Chinese inscriptions.

Enduring Commitment to Developing Intangible Cultural Heritage

Chen's fame has grown in recent years, as has the number of honors, awards and trophies he has amassed. He frequently gives live engraving demonstrations at exhibitions and museums, and some of his works have been acquired by art galleries and private collectors.

According to the Fifth Hangzhou Intangible Cultural Heritage Directory list of Projects, many of Chen's works have won awards. At the Third Festival of Chinese Art Treasures, the honor "Chinese Art Treasure" was given to *Fifty Tang Poems*. These were carved in cursive relief form and engraved onto a bamboo more than 40 meters long, the longest such work in China. A Gold Medal of China Arts and Crafts Industry went to *A Hundred Children at Play*, carved on bamboo measuring 128 centimeters long and 50 centimeters wide. The 12-meter long *Dwelling in the Fuchun Mountains* was awarded "Chinese Art Treasure" at the Fourth Festival of Chinese Art Treasures, and *Birds Paying Homage to the Phoenix* was awarded a Gold Medal of China Arts and Crafts Industry at the Shanghai Arts and Crafts Exhibition. His *Eight*

Immortals Crossing the Sea and *Dreaming of Jiangnan* won a Gold Medal at the China Arts and Crafts Exhibition held in Beijing.

Today, Chen's house is like a realm of bamboo. Totally committed to his bamboo engraving passion, as he himself says, "In this day and age, there are few people who can dedicate themselves to the craft, not to mention they have to be self-funded. It pleases me to sort out Jin inscriptions, carve their modern versions on bamboo in order to develop intangible cultural heritage. On top of that I hope that future generations will be able to see these works and pass them down to the next."

A Master Craftsman's Predestined Love for Bamboo Umbrella



Mr. Wen Dehan, inheritor of bamboo umbrella, an intangible cultural heritage item

China has a magnificent and elegant umbrella culture, one highly representative of her refined arts and crafts. They are objects of auspice and symbolism: for example, the bamboo ribs stand for long life, growing on and on, just like bamboo plants; its round shape when open implies happiness, reunion, and peace.

Jinzhu is a beautiful mountain village located in Yinhu Residential District of Fuyang, Zhejiang Province. It is rich in bamboo varieties, among them bitter bamboo, henon bamboo, and Moso bamboo. The local people have a love of bamboo that has been passed down the generations and they like to explore and expand its uses, for example in derivatives such as bamboo weaving, *Hu* writing brushes, and umbrellas. Craftsman Wen Dehan is a new generation inheritor of the bamboo umbrella craft of Jinzhu Village and a representative inheritor of the Hangzhou Intangible Cultural Heritage Program.

The making of Fuyang bamboo umbrellas can be dated back more than a century ago, to the late Qing Dynasty and the early Republic of China period. In 1951, an old umbrella craftsman by the name of Dai Rong'en from Jilongshan Village, having mastered oiled paper and silk umbrella making, established the Xinmin No. 2 Village Umbrella Rib Factory. At the age of 19, Wen Dehan was apprenticed to Dai Rong'en in order to feed the family. The young man was a hard worker; he followed his master's every move and seemed to have an implicit understanding. As his interest in the craft grew, the more skilled he became. His deep love for the art made him learn faster, and he could soon stand on his own feet.

In the 1980s, the village umbrella factory was facing bankruptcy due to poor management. Wen, unwilling to abandon a life-long skill, ignored the naysayers and took over the factory, going into business partnership with some kindred spirits. They mainly engaged in making oiled paper umbrellas utilizing Moso bamboo.

Under his management, the factory was brought back from the dead. Wen

Dehan came up with new and creative ideas. Through continuous research and development, constant innovation and transformation, dozens of product types were developed, the range growing to cover umbrellas of silk, oiled paper, cotton and thin silk, umbrellas for beach, dance, and tea ceremony, toy umbrellas and children's umbrellas, etc. The factory grew fast.

In 2014, Wen Dehan set up the Fuyang Fuyuntang Art Umbrella Factory. The umbrellas made in Fuyuntang vary in size from two *cun* (6.6 cm) to five *cun* (16.6 cm); they are of exquisite workmanship; the frame is made of many-years-old bamboo and the handle is of high quality wood; the paper is handmade, printed and painted by hand, and is oiled with natural tung oil.

Craft umbrella-making calls for great expertise and care. There is no modern technology that could replace the hand skills involved. After constant innovation by several generations, a unique craft has formed with features particular to Fuyang, such as “clip craft” in the making of the frame, and the use of “aromatic varnish” in the cover.

It all starts with felling the bamboo. As not all the bamboos on the slopes are suited for ribs, he has to search in the bamboo forest and make a mark as soon as a suitable one is found. Those chosen are cream of the crop, only one in hundred is taken, because they must be henon bamboo that satisfy the following criteria: five to six centimeters in diameter, uniformity of color, no speckles, neither too old nor too young, and neither too big too small.

Once chopped down, they must go through many procedures — scraping, planning down, framing, drilling, moth and mold proofing, drying, and painting to make into the ribs. Then follow a dozen more stages — wiping the bamboo, cutting the long ribs, weaving, shaping and adjusting, stripping the green layer, milling the grooves, cutting the short ribs, hole punching, etc.

Each procedure has its difficulties, especially shaping, stripping the green layer, and milling the grooves. But that's not the end of the story. Another 100 procedures await, such as making the cover, pasting the cover, threading the colored threads, printing, and dyeing. In order to guarantee long life, the umbrella ribs should be boiled and dried in the sun and then stained for durability and bug-resistance, so that they will be able to be repeatedly opened and closed more than 2,000 times. A 10-cm length of white rattan protects the umbrella handle and gives extra visual appeal.

There is a huge variety of covers. Some have traditional hand-drawn flowers and birds, while others show spring scenery; others are in single colors, among them bright red, light yellow, light purple, looking refined and natural. The most difficult process is hand painting. Wen Dehan led a group of local umbrella craftsmen, none of them with formal art school education but possessing sensitivity and experience, to create delicate colorful artistic umbrellas by embellishing them with different

kinds of pictures, among them portraits of ladies, landscapes, flowers and birds. As they say, “A Fuyuntang umbrella looks like a bamboo until it is unfolded.”

These exquisite umbrellas, the embodiment of the knowledge and meticulous effort of Wen and his fellow workers, have won many awards. Among them are the Cultural Creativity Gold Award, taken by the “Courtyard Umbrella” at the China International Light Industry Goods Exhibition in 2014. The artistic umbrellas produced in Fuyuntang are popular not only in China’s tourist market; they also sell well in such countries as the United States, Korea and Japan.

In order to protect excellent culture heritage in China, the traditional handcrafted umbrella has been listed in the second batch of national intangible cultural heritage and the first batch of key protected traditional arts and crafts of Hangzhou. This helps relieve Wen Dehan’s great concern about the heritage of handcrafted bamboo and paper umbrella culture.

Weaving Dreams, Inheriting Bamboo Artistry

Mr. Zhang Deming, inheritor of national intangible cultural heritage
— Qingshen Bamboo Weaving



Qingshen in Sichuan Province is the only place in China to be named by the Ministry of Culture as a homeland of bamboo weaving art. It boasts a history of bamboo weaving that is as long as it is exquisite. In recent years particularly, it has seen the emergence of many bamboo weaving masters. One of them is the 62-year-old Zhang Deming, inheritor of national intangible cultural heritage — Qingshen Bamboo Weaving.

Genesis: a Heritage Absorbed by Osmosis

According to Zhang Deming, in his early years, woven bamboo products were nothing more than commodities exchanged for the necessities of life. “Qingshen is the hometown of bamboo weaving, and back then every family without exception would weave such things as dustpans and fans. My grandpa died early, so my grandma used to weave basketry fans to exchange for money to buy basics.”

With the passage of time, experience instilled in him a better understanding of bamboo weaving.

At school, he learned from classmates the skill of fan weaving with thin bamboo strips so as to help out with the family expenses. At the same time, he employed a new method to weave simple patterns and words on the fans according to a drawing on paper. Later, he started working as a music teacher. In his spare time, however, he delved into the study of practical and beautiful woven bamboo products. Modestly, he turned to bamboo weaving teachers, artists and experts inside and outside the school and the province, giving himself to the teaching and research of bamboo weaving art.

Through sustained and concentrated effort, Zhang Deming gradually came to experience the infinite pleasure to be found in this art.

Teaching: Determination to Carry Forward the Heritage

At the end of the 20th century, economic factors made it impossible to continue the specialty of bamboo weaving in Qingshen. The prospect of this traditional craft being lost ripped Zhang Deming's anxious heart apart.

Zhang Deming, the then principal of a vocational school, carried out a survey and decided to restore enrollment into bamboo weaving classes. He invited junior high school graduating classes to visit and see weavers at work, giving them a feel for the charm of woven bamboo art. After this, he popularized bamboo weaving knowledge and works to every grade, class and student in his school.

He also compiled the lecture notes *The Essence of Chinese Bamboo Weaving Art — Graphic Bamboo Weaving*. These explained, for the first time, the history of bamboo weaving, its creation, value, and appreciation. They stimulated enthusiasm among students to learn the art.

Creating a Career: Enthusiasm for Bamboo Weaving

At the beginning of the 21st century, Zhang Deming threw himself completely into the cause of Qingshen bamboo weaving.

Over the next 10 years, he explored and delved into the features of the art, changing all the time; from reproducing subjects he turned to creative works; from similarity of form to seeking the soul of things; from monochrome and bichrome to polychrome works; from “yang” (raised) weave to “yin” (sunken) weave and to a mixture of both; from ordinary ornaments and handiwork to precious artworks and collection pieces; from dull bamboo adornment to a refined roller-mounting arrangement.

In 2005, after numerous trials, Zhang invented a new type of mounting technology for woven bamboo calligraphy and painting, using paper, silk and satin as the carrier. He applied for a national patent in April 2007. The new approach solved quite a few problems of traditional woven bamboo products such as discoloration, splitting, insect damage, low grade, low portability, and low durability. It also gave woven bamboo a more national character and enhanced its artistic quality.

He has created a type of foldable woven bamboo album, allowing separate tableaux to unfold and make a whole. Items such as the *Eight Immortals* and the *Twelve Beauties of Jinling* have been collected by connoisseurs.

After figuring out the method of warp and weft switching, Zhang Deming began to top the plain bamboo weaving with red color, then going on to apply third and fourth colors to create a multicolor work. When his *Tiger* was exhibited in Japan, it caused a sensation. His *Chinese Seal* won universal high praise at the Fourth Chinese Folk Arts and Crafts Expo.

Passing on the Art: a Ceaseless Pursuit

“Bamboo weaving was originally an activity pursued by the common people, but when exalted to art, it might not be easily accepted and appreciated by the general public. What I want to do is to bring woven bamboo elements into common households and take them to the international market, bringing Qingshen’s reputation for woven bamboo artistry to one and all, so it may continue for a long time,” Zhang Deming said.

In recent years, Zhang Deming has innovated with traditional woven bamboo on porcelain, and cooperated with the French luxury brand Hermès, taking Qingshen woven bamboo art into Paris, the temple of art.

At the same time, he has trained a great many bamboo weaving talents, and ventured into the broad domestic market. The initial results are promising. “We have launched some beautiful baskets and ornaments, which are quite popular with online consumers, and this implies a large market potential.”

“Unless it innovates, a folk art will wither away. Inheritance is the foundation and innovation is the way forward. Only with innovation can inheritance have historic and realistic significance.” Zhang touches the bamboo strips as he promises, “I will make lifelong efforts to pass on and develop Chinese woven bamboo art.”

Half a Century of Devotion, But Who Will Take Over?

Mr. He Minwen, inheritor of bamboo weaving in Fujian Province



When the older locals of Fuzhou cast their minds back, they remember that bamboo products were ubiquitous back in the days; for example, bamboo brushes for cleaning pots, bamboo mats, bamboo baskets and bamboo sieves.

As times move on, however, bamboo items have been gradually replaced by plastic and metal products, and bamboo weaving skills have slowly faded out of people's vision. There are few craftsmen making articles from bamboo strips these days, but He Minwen sticks to this traditional craft, aiming to bring bamboo products back into modern life.

A Family Tradition of Bamboo Weaving

On Macao Road, near the Three Lanes and Seven Alleys in Fuzhou, Fujian Province, you can find a bamboo shop, a humble establishment just 27 sq m in area. This shop sells all kinds of articles made of bamboo. Passersby will glance into the shop or perhaps buy some souvenirs. The proprietor He Minwen, a man in his sixties, often sits in front of the store while making bamboo products with his callused hands. When a passerby enquires about his goods, He will raise his head slightly, give a terse reply and resume his work.

He Minwen was born into a bamboo weaving family and was shaped by their influence. At the tender age of seven or eight, he started learning bamboo weaving from his father. Though weaving was a way of earning a living, he did not expect it would be a lifelong career.

In the 1970s and 1980s, craftsmen making articles from bamboo strips enjoyed boom. As He Minwen recalls, at that time there were a great many people involved with bamboo in Fuzhou, with more than 10 bamboo factories. Roadside bamboo shops were as numerous as barbers are today. Since the 1990s, traditional articles made of bamboo have been gradually replaced by attractive and cheaper plastic

products, and the market for woven bamboo has declined. The majority of craftsmen of He's father's generation people switched their trade.

A Fifty-Year Love Affair

He Minwen's shop sells more than 100 kinds of articles made of bamboo. By his own reckoning, he has made about 10,000 bamboo articles using simple tools such as bamboo knife, plane, hammer and saws. Sometimes, all he needs is his wood-handled, thin-bladed bamboo knife to produce bamboo products in various shapes.

In the opinion of He Minwen, the difficult thing is not weaving the bamboo, but splitting it: "To make bamboo products, you have to first learn how to cut thin bamboo strips. This may seem simple, but it requires meticulous control." It takes several decades to achieve perfection in cutting bamboo strips. One single careless action can cause injury. As he spoke, he lifted a leg of his pants to reveal a visible scar on his knee, which was caused by a moment's inattention when cutting bamboo strips in his youth. The wound was closed with four stitches, and he stayed in bed for a week. But rather than holding him back, this painful experience only strengthened his conviction.

In the eyes of his wife, He Minwen is an old rascal obsessed with bamboo. They have had neither soul-stirring love, nor romantic sightseeing tours. What they have is a simple life centered around the shop. He Minwen's wife says: "He just can't stop, and his biggest hobby is playing around with bamboo. Only by doing so can he feel good." Her husband has been in love with bamboo for half a century.

Continuous Innovation to Seek a Way Out

In He Minwen's estimation, there are about 1,000 craftsmen making articles from bamboo strips in Fuzhou, and few of them are highly skilled. None of his siblings or children has entered this business. He is the only one left in his family to keep the shop going.

In spite of the declining bamboo market, He Minwen has never considered giving up the business. He has improved and innovated the products in line with changing times. Besides producing articles for daily use, he makes props for drama troupes or bespoke products to order.

His years of experience have enabled He Minwen to develop a "signature skill." All he needs is a sketch to work on, and he can build a mental prototype and go on to make a physical product. If something needs to be remade, this perfectionist will keep working at it uncomplainingly until the customer is totally satisfied. "My biggest source of pride is to have my works recognized by everyone," says He.

Perhaps because bamboo is environment-friendly and non-polluting or perhaps because of people's increasing nostalgia for the past, the bamboo market has improved in recent years. Many foreigners have also fallen in love with China's

traditional crafts. He Minwen speculates, “Perhaps one day, advanced technology will bring new craftsmanship to bamboo weaving.”

“The reason I persist is because my love of bamboo has never disappeared,” He Minwen says. Running the old shop and safeguarding the old handicraft skill is a continuation of his dream. He anticipates that one day a successor will come along willing to take over from him, and perpetuate the craft of bamboo weaving.

Forty Years Spent Reviving Suzhou Bamboo Carving

Mr. Li Zongxian, representative inheritor of Suzhou bamboo carving



Since the book *Suzhou Folding Fans* was published, more and more people have been impressed by the elegance and refinement of Suzhou folding fans. Surprisingly, about 100 of the exquisite carved bamboo fan ribs illustrated in the book were made by the hands of one man. Li Zongxian, this ordinary 60-year-old, a resident of Dagongyuan Community, Shuangta Neighborhood, Suzhou City, is a representative inheritor of intangible cultural heritage — Suzhou bamboo carving.

Falling in Love by Chance

His graying hair is messy and he wears black-framed bifocals. His hands are rough and calloused — evidence of his 40 years spent in carving bamboo.

The atmosphere in Li Zongxian's family was an intensely cultured one. His father was an aficionado of calligraphy and wrote a good hand. Influenced by his father, the young Li became interested in traditional Chinese culture and arts.

When Li was a teenager, there were two lodgers in his old house, who engaged in flower-and-bird scroll painting. Every day, Li would be at their window, watching them at work. Seeing that Li liked drawing, they often called him inside and taught him how to outline and fill in colors, giving him a solid foundation for painting.

In the 1960s, the young Li Zongxian happened to see an exquisite old work of bamboo carving. It was love at first sight. He spent all his pocket money on the purchase of a carving knife, and would search around everywhere for pieces of bamboo to practice on. Thanks to his solid grounding in painting, Li quickly learned the ropes, even without a teacher to guide him.

“The way you use a knife to carve bamboo is connected to brushwork technique in painting. You have to have a grounding in painting to make a decent work of carved bamboo. Otherwise, the finished piece will be lacking, charmless. Nobody got me into this career. I came into quite naturally, not by design. It seems I was born to carve bamboo,” Li joked.

Admission Not Plain Sailing

After falling in love with bamboo carving, Li Zongxian originally planned to spend the rest of his life with bamboo and knife. But fate toyed with him: He sat for the entrance examination of Suzhou Art & Design Technology Institute on two occasions, but failed each time.

Chances favor the prepared mind. Li Zongxian’s luck changed for the better in the early 1980s, when the Suzhou Art & Design Technology Institute collected folk crafts from across the city for a large exhibition they were holding. One of Li Zongxian’s works, a bamboo carving in the shape of an animal, was selected for the exhibition and won wide acclaim from Suzhou’s arts and crafts world.

Not long after, Li was recommended to the Suzhou Arts and Crafts Research Institute, where he studied and restored Suzhou bamboo carving craft of the Ming and Qing dynasties. With this, Li Zongxian realized his long-cherished wish, stepping up from a folk bamboo carving enthusiast to the status of professional craftsman.

At the institute, Li energetically burrowed into documents, appreciated the masterworks of previous practitioners, and learned from colleagues. During that time, he avidly engaged in research and creation, nurtured and enriched his skills, gradually forming his own artistic style.

Li’s name started to get known among arts and crafts circles. His carved bamboo brush pot made in the 1980s was included in the book *Suzhou Folk Handicraft Arts*, published by Guwuxuan Publishing House.

Craftsman Spirit to Revive Suzhou Bamboo

Suzhou bamboo carving was at its peak in the Ming Dynasty but fell into decline after the Qing Dynasty. Li has long cherished the wish to revive the Suzhou school of bamboo carving so it can have its due impact in China and abroad. His devotion to this aim means he has been something of an outsider for more than 20 years.

“In the past, people believed the adage ‘the rich stash gold and jade, the poor take pleasure in bamboo items,’ so bamboo carving works never fetched high prices. Among Suzhou carvers there’s a saying ‘carve jade and you eat meat; carve bamboo and you eat porridge,’” Li Zongxian joked. But he is motivated by neither prestige nor riches. Instead, he sticks to his favorite occupation of bamboo carving, silently exploring, silently toiling.

“The reason why handicrafts become classics is that generations of craftsmen have adhered to fine workmanship, paying little attention to fame and prices. I mustn’t let them down.” After four decades of working with bamboo, his every word and action exemplifies bamboo’s qualities of modesty, honesty and noble character.

Nowadays, as people’s esthetic taste has improved, the market for carved bamboo works is heating up. Suzhou bamboo carving has become a representative traditional handicraft category, along with Suzhou jade carving and peach-stone carving. Since the publication of *Suzhou Folding Fans*, more and more people have become besotted by exquisite fan ribs, giving rise to a fashion for collecting these objects.

Today’s collecting craze has made a group of masters famous. However, Li Zongxian has never thought of working to please the market. He sticks to his own belief: “Every one of my works is my child. Once my name is carved on it, I must be responsible for it. The present price of each one is decided by the market. As to whether it becomes an enduring work, that is something history must judge.”

Carrying On the Tradition of Bamboo Poem Drawing

Mr. Wu Xu, a Henan master of bamboo poem drawing



“Not thanking the Eastern Lord’s intentions, with unswerving heart I establish my own reputation; Do not disapprove the solitary leaves as being simple, for they will never wither away.” This famous poem *Wind and Rain Bamboos* was written nearly 2,000 years ago by the great marshal Guan Yu in the Three Kingdoms Period. Far from being just 20 simple characters, it is a bamboo poem picture: The “wind bamboo” sways as if blown by wind and the “rain bamboo” droops as if hit by a storm. The leaves are simple brush strokes, whose various combinations form different Chinese characters, the result of which is a perfect blend of poetry, writing and drawing. This picture laid the foundation for bamboo poem drawing.

Wu Xu of Zhengzhou in Henan has developed the ancient Chinese classic art of bamboo poem drawing for the current age.

Carrying on the Family Tradition of Bamboo Poem Drawing

Wu Xu was born in 1952 in Yangqiao Village, Wantan Township, Zhongmu County. His grandfather had amassed a considerable collection of calligraphic works and paintings by famous practitioners, including rubbings of bamboo poem drawings inscribed in stone, and would often study and copy them. His father learnt the art under Wu’s grandfather and later devoted himself to inheriting and developing the 1,800-year-old art of bamboo poem drawing. In childhood, Wu Xu started collecting bamboo paintings and calligraphies and learning the art from his father.

One day, Wu Xu got a stone rubbing of a bamboo poem drawing from a friend. “I was overjoyed. It was exactly what my family had studied for generations,” he blurted out. Subsequently, he collected information about it and learned that it dated back thousands of years to the Three Kingdoms Period, and that only Guan Yu’s bamboo poem drawing *Wind and Rain Bamboos* survived. In addition, he found other eight

characters in the shape of bamboo leaves. These 28 characters were all that he was able to discover.

Resigning to Practice Full-Time

Given his childhood background absorbing the arts of calligraphy and drawing from his family, it was a natural progression for Wu to become an arts teacher in elementary school. He was also the deputy headmaster. At the end of 1982, Wu decided to quit his post for full-time study and creation of bamboo poem drawings. He said, "This was my grandfather's wish and I must fulfil it." After his resignation, Wu started to research bamboo poem drawing exclusively. "I didn't tell a soul about what I was doing. I practiced at home in secret, for fear of failing," he revealed.

Wu Xu delved into his research in a mixture of excitement and worry. He set to studying the sole surviving 28 characters. Initially he copied them and then copied each character's radical element onto pieces of paper, and put them up on the wall.

In that period, the only order of business each day was to study the 28 characters hanging on the walls, to scrutinize and copy them, and then start over, again and again. Eventually, once his copies were up to the mark, he began combining the radicals into more such characters. After seven years of assiduous study and practice, Wu's skills matured tremendously.

A Meticulous Artist

A bamboo poem drawing looks simple, but its creation is the embodiment of unremitting effort and solid basic skills. When practicing, Wu would use a single piece of Xuan art paper many times over for different purposes. "I'd practice drawing bamboo, then small characters, then cursive script, and finally large characters." Ultimately, every sheet of paper was totally full, with not a scrap of white space left. Despite his thrifty use of paper, he filled enough sheets to possibly fill a truck!

Wu Xu's works are certainly not dashed off: for every picture he is happy with, three are discarded and torn up. It takes at least a week to produce a completely satisfactory piece. "I would never allow for sale any substandard picture. There can be no sloppiness about this art."

In honor of the 62nd anniversary of the founding of the People's Republic of China, Wu created a 100-meter-long bamboo poem picture based on Mao Zedong's poems. This huge work, assembled from 25 small works, took two and a half years and more than 100 rounds of scrutiny and creative effort before being unveiled to the world.

A Xinhua Dictionary of Bamboo-Leaf Characters

Aside from his creative work, Wu Xu has made time to spread the art of bamboo poem drawing. Currently he is in talks with some universities in the hope of including it in their folk art courses.

But his even greater wish is to create a Xinhua Dictionary in which every entry is bamboo-leaf characters. “As a child, I had no reference work to draw on at all and I can’t allow children today to be deprived in the same way,” he says. Given his desire to pass down this tradition, Wu approaches his creation even more seriously and will ponder hard before committing a single stroke, normally doing at least three or four trials before the final one. It is nearly three years since he started the compilation but so far he has managed to create just half of the 36,000 characters in the dictionary. “In every spare moment I keep on refining it: it has to be perfect,” he says.

Though Wu Xu is now in his sixties, the inheritance and development of the art still keeps him busy. His hope, as a practitioner for over 30 years, is that he can revive and pass on to posterity the brilliance of this precious art, one created by the forefathers 1,800 years ago and missing for a thousand years.

A Disabled Bamboo Engraver with Great Ambitions

Mr. Fang Miaoxin, a bamboo engraver from Baizhang Town, Hangzhou, Zhejiang Province



At an exhibition of intangible cultural heritage products held in Yuhang District in the city of Hangzhou, visitors were drawn to the bamboo spectacle frames developed and made by Fang Miaoxin, a bamboo craftsman from Baizhang Town. The ten pairs on display sold out immediately.

Kindness and Help Between Generations

Fang Miaoxin is a native of Sixi Village under Baizhang Town, land rich in Moso bamboo. Now 45 years old, Fang was struck by polio as a child just starting to walk and has not been able to walk upright since then. Despite this disability, as he grew up, Fang's diligence and determination enabled him to become quite a master craftsman in bamboo engraving. Be it calligraphy or images, he just needed one look and he could use his graver tool to reproduce it vividly onto bamboo. In the process, he carved out a new path to a self-reliant life for disabled people.

Fang completed middle school but his family was poor, so he dropped out of education at this age. But one day in 1999, he received a visit from Ding Xiaolu, whose family had once been helped out by Fang's parents. Ding was now a member of the China Calligraphy Association. He suggested that Fang make the best use of the abundance of bamboo in the area and use this medium for engraving images and text. He bought Fang engraving tools, copy books and pictures, and came to instruct him frequently.

Diligence Opens the Door to Wealth

Fang started out by copying out some simple characters in black ink onto bamboo tubes and then engraving them. He gradually went on to try reproducing famous paintings and calligraphy onto bamboo. From start to finish, every one of the ten or more steps involved — including felling, segmenting and baking the bamboos — he

did by himself. Three months later, a friend was going to Hong Kong for a conference and gave Fang his first commission. At the rate of RMB300 per piece, he was to engrave four bamboo slips as gifts to his friend's business partners in Taiwan.

In March 2001, after media coverage of his story, Fang was invited to give regular demonstrations of bamboo engraving at the scenic spot of Baishuijian in Lin'an County. In 2002, he began to learn how to engrave calligraphy onto bamboo and became able to reproduce the famous calligraphic work *The Preface to Lanting Pavilion* by Wang Xizhi within four or five days.

The mayor of Ling'an acclaimed Fang as a wonder, and proposed that Fang's bamboo version of *Preface* be chosen as a local governmental gift to guests.

In April 2003, Baizhang Bamboo Street was set up. At the invitation of the Baizhang Township government and with the support of the local disabled persons' federation and the township government, Fang and another disabled young man Zheng Zhiqi opened the first folk bamboo culture studio in Baizhang Bamboo Street in Yuhang District.

A Keen Eye for Commercial Opportunities

Two years ago, Fang spotted a friend at a business event wearing unusual spectacles. The delicately-made frames were fashioned from bamboo — quite an innovation. Inspired by this, Fang plunged himself into developing bamboo spectacles. He undertook all the processes involved such as cutting, engraving, carving and grinding and went to Wenzhou City to seek trade secrets and accessories. Following one attempt after another, one trial and then further trials, in early 2016, he finally succeeded in creating durable, practical and ecological products with the natural beautiful lines of bamboo. In April 2016, Fang's *Carved Bamboo Spectacles* won a bronze medal at the Hangzhou Excellent Tourism Souvenir Competition. Now the bamboo spectacles are produced on a small scale, not enough to satisfy brisk demand.

Fang is quite positive that bamboo spectacle frames have rosy market prospects. At the same time as making them, he is always coming up with new designs. Meticulously, he engraves them with local motifs and strives to make them lighter, delicate, comfortable and culturally artistic. Now Fang cooperates with an enterprise in Lin'an, which is responsible for bamboo supplies and product marketing while Fang and his workers do the engraving work on their equipment. Currently, Fang's factory has developed over ten types of frame and produces 200 pairs daily. This is way short of market demand. His strategy is "to sell the products on-line while applying for a registered trademark to better publicize the products." On top of this, planned investment in new equipment for greater efficiency and output would bring day output up to 500 pairs, aiming for 10,000 pairs by the end of 2016, and double that number in 2017.

Repaying Kindness by Taking Apprentices

Fang is very aware that his achievements owe much to his teacher Ding Xiaolu, and to local government and social help. The government pays RMB10,000 annually for the rent of his two workshops which cover an area of 400 sq m. The District Association for the Disabled bought him a RMB20,000 laser bamboo-engraving machine to lighten the physical aspects of the work. Soon after opening his workshop in Baizhang Bamboo Street, he took on three apprentices.

Awards have followed Fang. He was named Entrepreneurial Star of the Disabled, one of the Top Ten Self-Reliant Disabled People, and Folk Artist of Yuhang District. These accolades are due to his never beaten spirit, his production of engraved bamboo artifacts such as bamboo calligraphy on computer-aided engraving machines, his setting up of the Zhuxin Bamboo Factory, and developing bamboo products such as bamboo mattresses, bamboo pen-holders and bamboo decorations.

In 2016, his bamboo engraving craft was listed as a key preservation project of traditional arts and crafts, and he was awarded the title of Hangzhou Folk Art Master.

The All-bamboo Shoot Banquet

Ms. Ye Meilan, founder of Yong'an's unique bamboo banquet



Ye Meilan is the fifth-generation owner of Yan Jianglou, a restaurant in Yong'an City, Fujian Province. Thirty years ago, Ye began her career in cooking and became the pioneer of a now well-known unique type of cuisine which utilizes bamboo shoots as the main ingredient. Because of her innovation, the fame of the bamboo shoot banquet has spread throughout Fujian. This special banquet attracts a large number of patrons both local and foreign.

Yong'an has vast resources of bamboo, which are cultivated on hundreds of *mu* (1 *mu* = 0.0667 hectares). Its specialty of dried bamboo shoots has a rich history, centuries old. In May 2000, Yong'an City was dubbed "China's homeland of bamboo shoots," which has brought the city to wider gastronomic attention. Locals are proud of the wide range of bamboo delicacies available. They include bamboo shoot tips, sliced bamboo shoots, instant bamboo shoots, table-ready boiled bamboo shoots in flexible vacuum packs. Bamboos are ubiquitous and available year-round. In spring, you can taste spring shoots; in summer, stone bamboo shoots and green bamboo shoots; in fall, sweet shoots; and in winter, winters bamboo shoots. Ye was struck with the idea of bamboo cuisine culture. Why not serve an all-bamboo shoot meal at her restaurant? It sounded good.

Ye tried treating this ingredient in different ways. She studied and experimented with bamboo cooking techniques almost daily. She stewed, she stir-fried, she steamed, she simmered, she roasted, and she braised. The flavors were sour, sweet, bitter and spicy. Once she thought the dishes were good, she invited tasters, young and old, officials and businessmen, to give objective and honest feedback on her products. She would then use that feedback to tweak the taste until all the tasters were satisfied.

In 2004, Ye and her four team members entered Fujian's 14th Chinese Chef Festival, their first-ever cookery competition. As their entry they prepared a feast of main course, soup, snack, and sculpted garnish, all featuring bamboo shoots as the

star ingredient. Their all-bamboo shoot banquet won the “Chinese Fine Dining” title, a good start for the future promotion of the banquet.

Ye’s ambitious “bamboo shoot banquet” won wide support from both professionals and customers. Despite the ubiquity of bamboo and bamboo shoots locally, in making a dozen fine dishes based on bamboo shoots alone the biggest challenge is the limited availability of the right kinds of bamboo.

Luckily, Wu Jilin, the former director general of Yong’an Forestry Administration, brought her a bucket of Zhejiang bamboo shoots acquired during his business trip to Zhejiang Province. Zhejiang bamboo shoots were perfect match to the culinary instincts of Ye. She took her chefs to Zhejiang to study how they cooked bamboo shoots there and brought back different varieties including Leizhu shoots, and hand-peeled shoots. She was able to inject more variety into her menu, enriching her cuisine in terms of flavor and texture.

Certification as Fujian intangible cultural heritage is currently being sought for the restaurant’s bamboo shoot cuisine.

The all-bamboo banquet comprises over a hundred dishes in a dozen categories. Each “green” dish is directly or indirectly made of bamboo. Every part of the bamboo plant — roots, shoots, stems, and leaves, crispy or tender, is fully used to create a refined and delicious experience.

As well as bamboo cuisine, a variety of delicious rustic bamboo dishes can be enjoyed in other local restaurants in Yong’an City.

A Cup of Bamboo Wine, a Marvelous Tale

Mr. Zhu Tianhu, chairman of
Sichuan Huozhiniang Bamboo Wine Co., Ltd.



Sichuan Huozhiniang Bamboo Wine Co., Ltd. is located in Dawang Bamboo Forest, Baijie Town, Luzhou City, Sichuan Province. To enter its workshop is like entering a museum of bamboo wine. Here bamboo and wine come together, habitat and health are conjoined. The creator of “Huozhiniang” (Living Brew), Zhu Tianhu, told us the fascinating tale of how bamboo wine was born here.

A Predestined Connection, a Unique Bamboo Wine

Zhu Tianhu was born in Luzhou, a place honored as China’s Wine City. He and *baijiu* spirit have been companions for 37 of his 57 years.

That bamboo wine has received a national invention patent is thanks to the cultural environment of the Wine City and the Homeland of Bamboo. Bringing together ancient and modern, Chinese and foreign alcohol technology, after researching and trialing historical uses of bamboo, the company daringly “innovated” by using bamboo in the fermenting of fine spirit.

“Wine-making with bamboo calls for the right bamboos, right latitude, right altitude, sunlight hours, cloud cover and rainfall amounts...” Zhu Tianhu listed the types of still and sparkling bamboo wine made by his company with great pride. “China is rich in bamboo varieties, with more than 60 genera and over 500 varieties. Sichuan Province has the most bamboo varieties and largest plantation area. It’s naturally endowed for making bamboo wine.” Since 1997, Zhu led his team in countless experiments in making bamboo wine and collected a huge amount of data in the process. On May 4, 2005, “wine in living bamboo and the method of fermenting” won a national invention patent and several awards.

Quality from Ample Resources and Inventive Processing

The company’s factory is located deep within a 100,000-*mu* area of bamboos, in the

Naxi District, a natural oxygen bar at an altitude of 800 meters.

Zhu explains, “We sited our factory here among the bamboo forest not just because of the pure water quality, but also because of the matchless natural environment, and, of course the rich bamboo resources.”

Large quantities of aged Huozhiniang bamboo wine are sealed up inside the company’s cellar. According to Zhu, “The climate and altitude of Dawang are ideally suitable for wine making. Apart from requiring the best base wine and best bamboos, we have to have a top-notch water source.” To this end, in one corner of the factory, Zhu has dug an 18-meter-deep well, so as to ensure water of the highest quality.

In the Huozhiniang workshop, Zhu Tianhu explained the traditional winemaking technique of making fermenting agent with rice bran, which contains a large amount of furfural. However, the company has replaced rice bran with crushed bamboo granules, which are natural and pollution-free. By replacing the rice bran and using a small amount of grain, the fermentation produces fresh bamboo wine with various original flavors.

According to Zhu, each category of bamboo wine they produce is individual and unique. The most special is the “Living Bamboo Wine.” To make this, a living Moso bamboo has holes drilled into it and quality wine is injected into bamboo via these holes. It is then sealed inside in the bamboo tubes. As the bamboo grows, the alcohol absorbs its flavor. The other type uses soaked bamboo roots, leaves, and stems. “Morning Dew Bamboo Shoot Wine” uses the sticky residue exuded by bamboo shoots in the early morning. This is collected and stored for blending with other bamboo wine.

In September 2015, Xu Yan, vice president of Jiangnan University and expert winemaker, and Zhong Jie, director of the Research Institute of Chinese Wine, paid a visit to the company and both spoke highly of Huozhiniang Bamboo Wine.

Win-Win for the Enterprise and Foresters

“By renting space inside the bamboos, it is not just the wine maker who profits, it’s the bamboo growers too,” Zhu explained.

Curious to see the process, the reporter accompanied him into the deep bamboo forest to see how bamboos can hold wine. The holes were drilled on each bamboo, starting from a meter-plus above the roots or from the tenth joint up, each section having a thumb-size hole sealed with a special bung. Although the process slightly “injures” the plants, they seem none the worse for the intervention, still thriving and healthy.

“Once a bamboo reaches eight to ten centimeters in diameter and is three years old, it can be rented out as a wine container.” Dawang Bamboo Forest is located in a rocky area, and every household owns quite a few bamboos. These bamboos are used to make boxes, furniture, chopsticks and other equipment. Felled, each bamboo

fetches about RMB15, depending on its size. In recent years, new ways of building mean that sales of bamboo have fallen and so have the prices. But the local farmers can rent out their bamboos to the wine factory at an equal or higher market rate. Drilling the stems and making some *baijiu* liquor damages the bamboo only slightly. Once the wine has been removed, the farmers can easily fell the bamboo and sell it, making two profits from the one bamboo.

Designer and Creator of a Bamboo Information Sharing Platform



Mr. Chen Hao, Nanjing Bamboo Media & Culture Co., Ltd.

Chen Hao has a special understanding of how to use bamboo in space design. He has energetically built platforms and takes an active part in online and offline activities so that more people will come to know, love and use bamboo.

A Liking for the “Rebar Plant”

It was a random project that caused Chen to fall in love with bamboo. When he undertook a hotel interior design project, someone suggested using bamboo rather than wood, and this provided Chen with an opportunity to learn more about bamboo. He came to realize that bamboo is low-carbon and environment-friendly, with good performance in processing. Processed bamboo is fire-, pest-, and decay-resistant, with great potential for use in interior design.

“Bamboo has great potential for creative application,” this is what draws Chen Hao to this material. In his eyes, bamboo is a “rebar plant,” a high quality building material. So, in many of his design projects, Chen tries to use bamboo rather than traditional wood materials, specifying it in the building of modern structures.

The more he used it in design, the more Chen became attached to this material. He cites its connotations of perseverance and humility, qualities that can be very useful in a Zen space. So, he often opts for bamboo, aiming to sublimate its intrinsic spirit in eternal beauty.

In Chen’s view, bamboo is the kind of material that can represent Chinese culture. However, because of its low level of marketization and the great difficulties in application technique, bamboo struggled to take a share of the high-end consumer market. Through his designs and development, Chen strives to explore the features of bamboo and its production process limitations, and to boost the value of bamboo.

Creating the “Bamboo Buildings” Website

Since starting to employ bamboo in his design projects, Chen has come into ever more frequent contact with bamboo manufacturing plants, craftsmen and bamboo aficionados. He discovered many difficulties in the application of bamboo. Due to poor coordination with bamboo manufacturing plants, designers did not know where to source better bamboo resources. Chen racked his brains for a solution. He tried to find a way to promote interaction and communication between all parties, to help them work together to solve problems in bamboo production and design. Then, the possibilities of the booming Internet use struck him and he decided to establish a sharing platform with the theme of bamboo.

In very little time, he founded the “Bamboo Buildings” website. It is designed to disseminate cultural and creative information on bamboo, get more people to share on the uses of bamboo in construction, and explore more possibilities of bamboo applications with bamboo enthusiasts, so as to boost the value of bamboo. Thanks to his efforts, this platform has helped establish effective mechanisms for sharing between bamboo designers, factory managers and enthusiasts.

Chen has no specialist background in bamboo, but he is always ready to learn. He strives to enhance the professionalism of the website. Through extensive cooperation with bamboo factories, designers and enthusiasts, the website has provided increasingly rich and more professional information, becoming more influential.

Supported by INBAR, Chen often discusses bamboo buildings and crafts with other bamboo enthusiasts on this platform. Following their exchanges, their discussions are collected, compiled and posted. In stages, the site has introduced bamboo weaving and bamboo banding techniques, which have been well received by netizens. Through this networking platform, architects, designers, bamboo manufacturers and suppliers have got to know and help each other, making joint efforts to develop and utilize bamboo.

Working Together for Bamboo Promotion

In addition, Chen Hao has organized many off-line exchange activities. The first one, held in Nanjing, attracted a considerable number of architects and designers, and focused on the current situation, characteristics and future development of bamboo. He has also organized bamboo design competitions. These activities have drawn more people to know, love and use bamboo, bringing new vigor to the development of the bamboo industry.

Chen Hao has organized visits by architects and designers to bamboo production bases, bringing them right up close to the bamboo production process. These visits have given industry outsiders insights into ways of processing bamboo, including high-temperature, water immersion and smoking processes, and inspired more ideas for using and designing with this material.

Chen has also organized bamboo application and design competitions, in fields such as architecture, interior design, furniture and industrial products. He hopes that design will generate more beautiful applications for bamboo, increase its added value, and improve the bamboo industry's overall competitiveness.

Today, Chen has achieved his first goal for the establishment of the platform; namely, spreading and sharing bamboo information. His wish is to work together with more friends in developing bamboo and getting more people to accept bamboo materials.

“Feng the Bamboo Carpenter” Returns Home and Starts a Business



Mr. Feng Guangjun, an arts and crafts master of Chongqing

Bamboo strip product craftsman Feng Guangjun has quite a name as an arts and crafts master in Chongqing and has been honored as May Day Labor Medalist.

In his own words, “Bamboo is like a life-long partner to me. It’s long been an integral part of my life.”

Feng was born in Liangping County, Chongqing, known as the “land of bamboo.” His childhood was spent surrounded by bamboo, which was a major source of food and family income.

Feng recalled, “My father was a well-known craftsman in my village, making articles from bamboo strips. At that time, this occupation was major source of additional family income for villagers. As a little boy, I would watch the male adults carving bamboo tubes and weaving bamboo baskets and chairs, and I developed an intense interest in this craft.”

Immediately after school classes, Feng would beg his dad or his uncles to teach him the craft. Under their tuition, he would use clay and turnips to practice the basic skills of bamboo carving, such as turning, engraving, inserting, painting, pivoting, and cutting. His palms were full of blood blisters and knife cuts, but every bit of progress made gave him pleasure.

After many years’ practice, Feng mastered all these skills and was determined to inherit and develop his father’s north-east Chongqing bamboo crafts. His spare time would find him reading widely on philosophy, literature and esthetics so as to broaden his artistic horizons and refine his esthetic taste. On weekends, he would go to the bamboo forest near the factory where he worked, searching out the right bamboos, and from these he would make all kinds of articles for his workmates.

In 2001, his factory was restructured and Feng faced the problem of re-employment. Now, he thought, was the right time to work full time at what he was good at. So he returned to his old home, set up a small bamboo and wood products

workshop, and prepared to embark on his future career.

Recalling the early days of his business, Feng said, “The early days were really tough. Plastic was the mainstream material for daily life products; bamboo and wood products had a very small share of the market. In order to save traveling expenses, I’d walk about 10 to 15 km to push the products.” Over a year of strenuous effort, he gradually built a personal client base, and his business seemed to be on the right track.”

But it nearly derailed. One day, he got a call from a supermarket selling his products, complaining that they had been found to be worm-ridden and that customers were demanding their money back. After Feng confirmed the quality problems, despite the big financial hit implied, he refunded everyone at the original price. The tiny worm holes cost Feng almost all of his previous year’s earnings.

Nevertheless, his love for bamboo and his dogged character made Feng resolved to borrow money and start over. He borrowed from his relatives and friends to purchase raw materials. At that time, many bamboo businessmen chose to treat bugs with chemicals, but Feng insisted that, since his bamboo products were both traditional handicrafts of his village and daily necessities, all harmful substances were taboo. This was not only his commitment to customers, but also the bottom line of a “bamboo carpenter” who must stick to traditional craftsmanship.

To solve the wormhole problem, Feng returned to his village to consult experienced bamboo-carving masters. He would also read about and research the problem; in his spare time, he would take the worm-ridden carved bamboo products in his hands, turning them over, racking his brains about what to do. Mr. Wu, his business partner of many years, recalled, “Feng was obsessed; he wouldn’t let go of this tough problem, and it caused many rows between him and his wife. I tried to talk to him out of it, but he insisted on trying for better solutions.”

After many experiments and trials, Feng solved the worm-hole problem. It involved the traditional method of steaming, boiling and roasting, plus a coating formula of his own invention.

His efforts paid off at last. His new eco-friendly bamboo products, combining traditional craftsmanship and natural processing, were an immediate hit on the market. A Chongqing toy factory placed a big order of 10,000 bamboo toys. Dealers from other provinces also came to order his new products and a large food factory in Tianjin signed a long-term contract with Feng.

Mr. Wu added, “Feng often argues with me regarding the rise in costs stemming from improving the products. To my mind, he’s more of a craftsman at heart than a businessman.”

Today, Feng’s small workshop has become a bamboo handicraft company employing more than a hundred people, and its annual sales amount are approaching RMB10 million. Feng, the boss of the company today, will occasionally play around

with his bamboo and teach his children the crafts in the hope that they will be passed down the generations. Feng often says, "I prefer to go without meat than live without bamboo. I lived among the bamboo forests as a kid. Bamboo grows upwards, section by section; the purity and perseverance of its nature embody the spirit of Chinese craftsmen."

A Bamboo Flute Master from the Homeland of Bitter Bamboo



Mr. Dong Zhongbin, a bamboo flute master from Zhongtai in Zhejiang Province

Zhongtai, in the Yuhang District of Hangzhou City, has produced a master of the bamboo flute — Dong Zhongbin.

An Unbreakable Bond with a Bamboo Flute Master

The climate and soil conditions in Zijin Village in the jurisdiction of Zhongtai Township are particularly suited for the growing of bitter bamboo, and the villagers' chief source of livelihood is the production and sale of bamboo flutes and pipes. Zijin has over 100 workshops producing these instruments, which are sold throughout China, South East Asia, South Korea, and Japan. This is the story of Zhongtai's dramatic change from the "homeland of bitter bamboo" to "China's homeland of bamboo flutes." Much of this change has to do with Master Zhou Linsheng, of the Shanghai National Musical Instrument Factory.

In 1984, Zhou went to Tonglingqiao Village to select bamboo for the factory. It was around the time of the winter solstice, the bamboos were blanketed in snow and there was a fierce wind blowing. According to Zhou, "When making flutes for distinguished flautists you have to be ultra-fussy about selecting the right bamboo. At the winter solstice, bamboos are hard and invulnerable to bugs and the section near the root of a three-year old bamboo is the best part for a flute." Climbing a slope in search of the right bamboos, in his deep absorption he tripped and fell, rolling quite a distance down the slope. He broke three ribs and was in agony when Dong Zhongbin, the village chief, happened to come along. Dong carried Zhou to his home and took good care of his injuries, thus the beginning of a lifelong friendship. That same year, they jointly established the first flute and pipe cooperative.

The First Flute and Pipe Cooperative

Dong was among the first group of people involved in flute-making in Zijin Village.

In 1989, he established the first flute-making enterprise in the vicinity, Lingsheng Musical Instrument Factory. At Zhou's recommendation, Dong led a team of 18 young men to Shanghai National Musical Instrument Factory to learn how to make flutes. In 1998, a Beijing branch of the factory was established under the leadership of Dong's son Dong Xuehua.

"Who could have imagined we'd be living such a happy, comfortable life!" Dong exclaimed. Although the village was surrounded by mountains clad by bitter bamboo, the villagers led a hardscrabble life in the past, felling and selling the bamboo for firewood or as raw materials for bamboo poles, fishing rods and mosquito net rods. This was because the shoots of bitter bamboo are inedible. Bitter bamboo was sold cheaply, ten cents per *jin* (0.5 kg). It was not until the end of the 1980s and with Zhou acting as the middleman that villagers found the way to prosperity by learning how to make flutes from bitter bamboo.

"The making of a flute involves 14 steps, including baking, drilling, lining to set the tone, punching, tuning, jointing, varnishing, thread-wrapping, and carving. My factory makes 1,000 flutes a month on average, and every one is checked by me personally before it leaves the workshop," says Dong. Today, Dong has been engaged in his business for nearly 30 years. At 66 years old, he is not the oldest in the village, but he is considered the oldest master as he has helped many other villagers learn how to make flutes and set up a host of workshops making bamboo flutes. Nowadays, as you come into the village, almost every house is a flute workshop. In this village of 700-odd households, there are over 100 flute workshops, more than 20 processing studios, and over 50 on-line shops. With the old master's help, the young villagers sell flutes on-line and Zijin has become the main production base in the "homeland of bamboo flutes."

Passing Craftsmanship from One Generation to the Next

Dong Xuehua has been making flutes for 12 years, ever since his father referred him at the age of 18 to the Shanghai flute-making master Mr. Zhou. Now Dong Xuehua is a prominent expert in flute and pipe making. In 1999, China's President Jiang Zemin went on an inspection visit to Wudang Mountain to hear Daoist music. When the Daoist priest Zhao Lianwu played *A Wonderful Night in Spring* on a bamboo pipe, Jiang took a liking to the instrument and remarked, "This quality pipe produces a good sound, so it must be made of the best bamboo." On being told that the maker was Zhou's student Dong Xuehua, the president immediately instructed his entourage that the pipe produced there be made a state gift to honored guests.

Early this century, Dong Zhongbin established a Beijing office under the management of his son Dong Xuehua, who also makes flutes himself. The branch is in fact a workshop for making top-notch bamboo flutes. All professional flautists, whether they are from the south or the north, prefer flutes made of white bamboo.

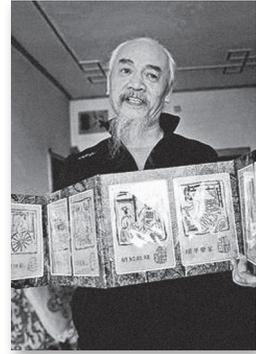
These flutes can only be produced in the southern regions. This workshop chiefly produces delicately engraved medium and high-grade flutes, using quality bamboos selected by his father from those grown in Tonglingqiao and transported to Beijing.

Meanwhile Dong Zhongbin still makes flutes in Tonglingqiao Village at the Lingsheng Musical Instrument Factory, which employs a score or more of technical workers. He rents 20 *mu* (1.3 hectares) of bamboo forest to guarantee the supply of quality bamboo. However, even with this much bamboo, supply continues to fall short of demand. He has to assign a dozen workers who are adept at selecting bamboos to go into mountains and find the right raw materials. Nearly 30,000 flutes are produced annually; more than half are sold on the domestic market and the rest are exported to Southeast Asia.

A common bamboo flute not only produces beautiful and moving melodies, but also echoes Dong Zhongbin's life-long passion for the art.

The Founder of Bamboo Husk Carving

Mr. Wen Yuguang, a master of arts and folk crafts of Chongqing



Wen Yuguang is 65 years old, a master of folk arts and crafts in Chongqing Municipality. Whenever his works are shown, be it in China or abroad, there will always be a crowd of people enquiring: what exactly is the material used?

When they get the answer — that it is bamboo husks — people gasp in admiration: what a natural and special art form it is! Wen Yuguang is the founder of bamboo husk carving. His bamboo husk pictures have a metallic luster and subtle natural shading. On top of this, his profound carving skill and diverse subject matter rich in cultural connotations make his works appreciated and prized by artists and collectors at home and abroad.

He attributes his choice of medium to a predestined affinity.

Predestined Connection: Wanting to Turn Trash into Treasure

In the Cultural Revolution period, Wen Yuguang was in the first batch of educated urban youth from Chongqing to be sent to work in the countryside. In 1969, he was sent to the mountains of Shizhushan where he settled and stayed for eight years. “We got up to work at sunrise and went to bed at sunset. Life was busy and hard, but was free from all kinds of interference from outside,” recalls Wen. The distraction-free environment calmed him and he was able to experience the locals’ sincerity and simplicity, and the beauty of nature.

It was during this period too that bamboo husks started to captivate him. Behind his house was a green bamboo grove. Wen would often go there, picking up the shed husks and observing them carefully. Hairy on the outside, it looked ugly; but the inside was glossy and smooth, which touched him deeply. Would it be possible to turn this into something precious?

He gathered a few of the husks, tried to cut them into bottle covers but found them very fragile, prone to splitting, and impracticable. He had to bury the idea of

turning them into wealth. Even so, in his downtime, he would pick up a few husks and practice his calligraphy by writing quotations on the inner side.

Attachment: 40 Years of Trial and Error Bears Fruit

In 1976, Wen was sent as an oil worker to the mountains of Zhongxian County to drill wells. The tedium of life there reignited his literary feelings and so, in his spare time, he went to the local cultural center to learn skills from master teachers. He learned to sketch and paint in traditional Chinese style. Meanwhile, he read extensively about wood carving, bamboo carving, stone carving, and calligraphic seal cutting. In order to improve his carving skill he would get rocks and soap from the drilling crew to carve but the results always fell short of what he hoped for.

Once, on the way home from work, he came upon a bamboo grove and an idea struck him: the insides of bamboo husks are so smooth, maybe they could be used for carving?

So, in his spare time, Wen Yuguang put his mind to exploring carving bamboo husks. He started with simple poetry, line drawings, and craft designs, and progressed to other subject matter such as portraits, landscapes and history. Through 40 years of exploration, his attainments in bamboo husk carving have become ever more accomplished. His *Portrait of a Lady* is simple but vivid, *Poetry and Painting* traditional but penetrating, *Suspended Building* austere but charming.... In addition, he has also arrived at a technique of using a knife as a brush to draw pictures, mastering a range of skills for working with bamboo husks.

Wen Yuguang has garnered awards aplenty. In 1989, his *Long Live the Motherland* was awarded the “Pegasus Prize” in the first national workers’ art grand prix; in 2013, his *Panda* won the silver award at the exhibition of China Ebony Root Carving Art Festival; in 2014, his bamboo husk carving technique was identified as an intangible cultural heritage project of Chongqing. His works have been collected by Zhejiang Art Museum, Chongqing Three Gorges Museum, and collectors in the United States, Australia, Germany, Japan, etc.

Continuing the Heritage: Instructing Apprentices Free of Charge

Wen tells us, “Bamboo husk splits easily, so you have to be calm and patient when working with it. The void-solid lines and subtle intention cannot be expressed without skilled use of the knife, simple composition and natural delicacy.... I attribute my achievement to my ‘educated youth’ experience in the countryside and in the drilling crew.” The ability to endure loneliness he singled out as a crucial factor.

Recently, he is busy reaching out into the community, hoping to attract people for free instruction in bamboo husk craft. “I want to impart my craft to future generations without reserve.” From his artistic career he has learned the truth that life should be like a bamboo husk, seeking nothing in return for its self-sacrifice,

devoting the brightest and cleanest side to the young shoot, caring for its growth, and wearing an ugly “coat” itself before shedding.

“I will do my utmost to make the art endure, getting future generations to carry on and develop its spirit.” According to Wen, this was also his original intention motivating him to explore the art.

An Ordinary Old Man with an Extraordinary Bamboo Carving Career



Mr. Wang Shihui, an arts and crafts master in Hunan

He made three thorough site investigations of the famous Yueyang Tower, recording with a camera and measuring dimensions with a ruler. At the age of 75, he searched all over the mountains of Western Hunan for raw materials, and within 20 months he created his fabulous *Miniature Yueyang Tower*. Reflecting the Tujia ethnic culture and integrating it with bamboo craftsmanship, he has with divine skill created a unique style of bamboo art. This man is the bamboo carving master Wang Shihui, an arts and crafts master in Hunan, a representative inheritor of Western Hunan's intangible cultural heritage.

Wang Shihui, of the Tujia ethnic minority in Western Hunan, was born in 1937 in Guitangba, a town in Longshan County, Hunan Province. His grandfather was a well-known local carver. Living with his grandfather from childhood, Wang Shihui was greatly influenced by what he constantly saw and heard, and this led to a keen interest in delicately engraved bamboo works. Therefore, at the tender age of eight, he began to learn bamboo craft. After the People's Republic of China was founded in 1949, Wang Shihui was drafted into the army, and later transferred to civilian work teaching in an elementary school in Longshan County. But three decades of service in the military and teaching profession in no way dimmed Wang Shihui's love for the bamboo arts.

After retiring in 1990, Wang Shihui was able to devote himself totally to bamboo carving. Building on carving techniques from elder generations, he integrated bamboo craft with local Tujia folk culture, creating "miniature bamboo carving," a new form of bamboo art. He has created a series of exquisite works.

Every small detail in his works is honed to excellence. Every aspect — material choice, mortices, chiseling, and tenon joints — perfectly reflect the Tujia traditional building process, without any detail missed. Well-proportioned, compact-structured, with elegant lattices in doors and windows, and miscellaneous items copied to the life, his works looks like a single moment of time caught in quietude. Doors can

open and close, pestles can pound, and mills can turn. There are clay jars, strings of peppers and corncobs, human figures, and livestock, all made vivid and natural under the old man's touch.

One day in early April, 2011, Wang received a call from the cultural affairs department of Hunan Province, informing him that an International Cultural Industries Fair was to be held in Shenzhen in May, and they wished to display his work *Tujia Bamboo Carving* in the Intangible Cultural Heritage Exhibition Hall. His work *Handiwork of the Bizika (Tujia) People* is over a meter in length and is quite heavy. Without a car it would be impossible to carry it.

With the help of some kind-hearted people, he, his wife, son and daughter rented a car and drove it to Shenzhen from their remote mountain area. He had spent three years on this work. It showed traditional Tujia architecture and a part of traditional Tujia culture, the marriage of a daughter. Quite a few people came to the exhibition stand out of admiration for the famous carver, but the modest senior put his hands together in a gesture of respect and thanked the audience for their compliments, saying, "I just want to show Tujia culture." Wang looked as happy as a child when talking about his work.

In 2012, Wang Shihui's work *Yueyang Tower* was on show in the exhibition hall in Changsha City, Hunan Province. The material for this piece originates from the *meizhu* bamboo in Western Hunan. *Yueyang Tower* was carved at a scale of 1:50, with every element fashioned by hand. Not a single iron nail was used, and the structure was built with the traditional craftsmanship using the mortise, chiseling, and tenon structure. The door and window lattices on each floor and the decorative railing patterns are exquisitely carved. Camellia phoenix, water dragon, and Swastika-shaped plum blossom adorn the upswept eaves of the first, second, and third floor respectively, and look more natural than the real thing; especially lifelike are the beasts under the eaves, all of them in different attitudes.

"I spent 14 months on it. I put my mind to this and nothing else apart from food and sleep," said the 75-year-old Wang Shihui. In order to complete the work, he visited Yueyang Tower three times to photograph, take measurement, and sketch its design. Yueyang Tower is the only large "helmet roof" structure tower in China, making it extremely difficult to carve. The design requires smooth lines in arc grooves, and the curved roof tiles must be even and regular, and these considerations called for super-large "S"-shaped *phyllostachys pubescens* poles. Wang Shihui spent months scouring the mountains of Western Hunan to find material consistent with the object. During the exhibition period, many people asked what price he wanted for it but Wang declined all offers.

Wang Shihui is now 79 years old. He has won countless awards at home and abroad, is feted as a Hunan arts and crafts master, and a representative inheritor of Western Hunan intangible cultural heritage. But Wang remains fixated on studying bamboo craft and planning his next work.

Bamboo Farmers

In the overall appreciation of China's booming bamboo industry no one should forget the great many bamboo farmers who are the cornerstone of this industry. Of all participants in this industry, it is the bamboo growers who are the largest constituency. In the rapid take-off of China's bamboo industry the contribution of bamboo farmers has been indispensable.

The people introduced in these pages represent local farmers. They include female entrepreneurs, pioneers who have led fellow villagers to riches, and founders of cooperatives. They are classic examples of the majority of bamboo farmers. They are ordinary farmers, but farmers of rare capability.

Women account for a large proportion of rural workers; they shoulder heavy labor in bamboo groves, making an important contribution. Female partners Yao Youfeng from Libo County, Guizhou Province, and Libo Maolan of Karst Specialist Bamboo Crafts Cooperative successfully registered the trademark "Maolan Bamboo Craft." Liu Caifeng from Pingyao Town, Yuyao District, Hangzhou City, developed 100 *mu* (67,700 sq m) of mountain wasteland to cultivate bamboo shoots and also studied, accepted and started up-to-the-minute e-commerce.

There are many successful rural pioneers. Zhou Jindi, a local farmer of Tonglu County, Zhejiang Province, invented a machine for peeling raw bamboo shoots and received a utility model patent certificate issued by the State Intellectual Property Office. This efficient machine helps an increasing number of farmers raise their productivity and lower their labor costs. Lin Zhaoying, a villager from Houlou Village, Yangzhong Town, Youxi County, Fujian Province, is dedicated to planting and cultivation techniques and has become a well-known "indigenous expert" in his town. Tong Miaosheng is a bamboo farmer of Tonglu County, Zhejiang Province. Tong's dedication to Leizhu bamboo has made him wealthy, and his guidance has also brought wealth to many farmers in the surrounding area. Other veteran bamboo

farmers include Huang Engui of Datong Town, Chishui City, Guizhou Province, and Yang Guosong of Shangping Town, Yong'an City, Fujian Province. They are all experienced experts in bamboo industry management, all indigenous experts.

Cooperatives play an important role in rural bamboo forest industry. The inspiring story of Wang Jianwen, director-general of Wuming Moso Bamboo Cooperative, is told in the book. Wang Jianwen, a disabled youth from Zhangzhuang Village of Zhangzhuang Town, Anfu County, Jiangxi Province, founded the Wuming Moso Bamboo Cooperative. He helped more than 10 families with disabled persons join free of charge and to establish a deep bamboo processing base in Zhangzhuang Village. Today, his cooperative has an annual income surpassing RMB4 million.

China's countryside has taken on a new look since the initiation of reform and opening up in 1978, but there are still a great many poor people, many of them living in bamboo producing areas. Working with bamboo is still an option for farmers looking to rise out of poverty. With the gradual improvement of bamboo land system reform and the acceleration of urbanization, China's bamboo towns will produce more representatives of bamboo farmers and will also provide readers with more exciting stories.

Leading Bamboo Farmers to Prosperity

Mr. Jiang Changfu, a national model worker from Chongyang Village, Lin'an, Zhejiang Province



Jiang Changfu, a senior agricultural technician, comes from Chongyang Village, Lin'an, Zhejiang Province. He is a national model worker and villagers see him as the “king of Leizhu bamboo” for his role in leading them toward to a life of plenty.

Great Growing Potential on the Mountains

Lin'an is nationally famous as a base for growing Leizhu bamboo (*Phyllostachys praecox*, a bamboo shoot species), and every winter and spring great quantities of the shoots are sold to Shanghai, Hangzhou, Nanjing and other big cities, enriching local farmers. Jiang, nearly 60 years old now, has been growing them for 40 years, since leaving the army in 1976. According to his fellow-villagers, Jiang was cultivating bamboo in scientific fashion even in his twenties. In 1986, the year he returned to the village, he had only 2 *mu* (0.13 hectare) under cultivation. After many years of committed and painstaking research and bamboo growing, he has a plantation of 48 *mu* (3.2 hectares) raising Leizhu bamboo. He excels at fertilization, conservation and digging bamboo shoots. His annual net income is about RMB180,000.

Right from the outset, Jiang was very positive about growing this species in the mountains, and proposed that villagers develop a green economy by growing Leizhu bamboo shoots. He donated bamboo seedlings to the villagers and instructed them in great detail how to plant them deep, water and mulch them. He not only instructed them in key seasons, but also reminded them of the timing of bamboo growth and provided them with marketing information over the radio or via text messages. For all these contributions, he was rated as a model worker at the county, municipal and provincial levels consecutively. He topped this by winning the honor of “national model worker” in 2005.

“Teach a Man to Fish Rather Than Give Him Fish”

As Jiang's fame as a master grower of bamboo shoots grew, more and more people from Lin'an and elsewhere came to visit him, seeking his advice or ordering bamboo seedlings. Jiang always made them welcome, answering questions patiently and in detail. For many years, his advice has been sought from many parts of China, from Sichuan and Hubei provinces for example, and from 20 cities and counties within Zhejiang, among them Changshan, Zhoushan and Yuyao. The advised area of Leizhu bamboo under cultivation now exceeds 5,000 *mu* (333.3 hectares). The forestry authorities of Chongyang in Hubei, De'an in Jiangxi and Qingtian in Zhejiang have all presented congratulatory plaques or banners of gratitude to Jiang.

Jiang often says “Commitment is the key to growing good bamboo.” In his opinion, many farmers start to grow bamboo on impulse but fail to care for them adequately, causing them to wither and die as a consequence. According to him, cultivating a bamboo plantation has much in common with raising a child; it takes time and consistent attention, otherwise, there may be high yields for the first few years but later on the forests will weaken and die out. Therefore, the growers should shift their vision from short-term profits to long-term gains, so that the green economy of growing Leizhu bamboo may develop and thrive.

Jiang Shares His Know-how

Jiang has been cultivating this species for about 30 years, most of his bamboos having been planted in the early 1990s. He has long taken a scientific and progressive approach to cultivation and the 48 *mu* (3.2 hectares) that he works on is thriving; the soil is non-compacted and there is no degeneration, and the age structure and density of planting is quite rational. Thanks to their black leaves, sturdy bodies, firm rhizomes and tender shoots, Jiang's bamboo shoots always fetch a good price.

Jiang identified five growing tips for the benefit of fellow growers.

Digging out old bamboos

In late May, Jiang will call on the villagers to dig out five-year-old plants, on the grounds that they are too old to generate shoots and therefore should make room for younger bamboos.

Preventing diseases and killing pests

The period after harvesting the shoots is the key season for action against diseases and pests. They must be eliminated early to ensure the healthy growth of young bamboos.

Applying fertilizer

After harvesting the shoots, it is urgent to apply fertilizer as this is a nutrient-consuming process and the rhizomes require nutrients for the growth of young bamboos.

Loosening soil for the growth of rhizomes

After harvesting shoots, loosening the soil is vital for high yields the following year, irrespective of whether or not a mulch of wheat husks and rice chaff is applied to the bamboo plantation. Full clearing of the site, loosening of soil and cutting off rhizomes above ground enable the rhizomes underground to go deeper and grow bigger, making for high yields of strong bamboo shoots in future seasons.

Pinching out tender bamboo tips

Pinching out tender bamboo tips will “dwarf” the growth, boosting resistance to wind and snow burn.

“A single flower does not make a spring,” as the saying goes. Jiang’s example was soon followed, with the vast majority of villagers adopting the scientific approach to cultivation, the only sure source of good income.

One might say, it wasn’t so much the bamboo but Jiang that led Chongyang Village to prosperity.

Leading a Disadvantaged Group into Entrepreneurship Through Bamboo Weaving



Ms. Wan Xue, a master weaver of the Banzhu Bamboo Arts Co., Ltd. in Gaoping District, Nanchong City, Sichuan Province

In Banzhu (Mottled Bamboo) Township, Gaoping District, Nanchong City, Sichuan Province, there is a group of people who weave bamboo into fine handicrafts to be sold for a profit. Their leader is a woman named Wan Xue, a master bamboo weaver of the Banzhu Arts Co., Ltd., and one of the first five studio masters to be certified by Nanchong City.

Wan Xue was born in a rural family in Qingshen County, Meishan City, Sichuan Province. Qingshen is a homeland of Chinese bamboo weaving arts. As a young girl, Wan often saw her father weaving farming items from bamboo, and, under his influence, she took to bamboo weaving. In 1988, 17-year-old Wan Xue joined a bamboo arts company in Qingshen County to learn bamboo weaving. Her hard work and excellent skills were rewarded with promotion to director of the company office and she worked there until 2009.

In 2006, officials of the Banzhu township government came to Qingshen to inspect the local bamboo industry there, and invited its technical staff back to Banzhu to train their own weavers. More such visits followed and the technical staff of the company where Wan Xue worked were invited to Nanchong to train the local weavers. With the approval of the company leaders, Wan Xue decided to strike out on her own in Nanchong. She arrived in 2009, quite alone, and bringing with her just one suitcase.

Wan says that an unworked piece of bamboo can fetch a few dozen yuan at most, but when transformed into handicraft, it will sell up to RMB1,000. The reason for this high return is the difficulties involved in the weaving process. A bamboo must go through 32 stages in its journey from initial state to bamboo handicraft.

After coming to Nanchong, Wan Xue registered the Banzhu Arts Co., Ltd. of Gaoping District, Nanchong City. For two years, she lived and worked in the factory, totally focused on developing the company. She learned that although more than 20 people in Banzhu had been trained in bamboo weaving, they could only weave small

items: large, refined pieces were beyond them.

Drawing on her own skills acquired over the years, Wan Xue led her bamboo weavers in upgrading their skills. Bamboo handicrafts are produced mainly by hand, but when it comes to pieces that involve sophisticated weaving techniques, auxiliary tools must be used. Through constant exploration, Wan Xue innovated the weaving tools. The crochet hook, an important tool in the weaving process, is used in weaving refined pieces such as calligraphy and paintings. “In the past, when weaving calligraphy and paintings, the workers had little trouble weaving from left to right, but weaving from right to left was quite another story,” said Wan. She found that by drilling a hole in the crochet hook the workers could weave from right to left with equal facility and the problem was thus solved. With this adapted tool the time spent in weaving a work of calligraphy or painting has been halved, from six to three hours and efficiency has been greatly enhanced.

The company’s best-sellers are its lampshades. Now, the weavers of Banzhu Township can weave over 10 kinds of lampshades in different shapes. Bulky, dainty, square, round...they all come easily. Apart from lampshades, the company also produces artworks such as bamboo screens and bamboo calligraphy and paintings.

In 2014, in order to open up the sales market, Wan started selling on-line. The exquisitely-shaped fine bamboo artworks successfully measured up to national market needs, sales were encouraging and favorable feedback from online buyers gave a big sense of achievement. Currently, 80 percent of the company’s revenue comes from e-commerce. “We have quite a job keeping up with orders,” she says with a smile, gesturing toward to a stack of orders by the computer.

After six years of development, Banzhu Bamboo Arts is riding high. Currently it has over a hundred employees on the payroll, up from just over 20 at the start. It sells over 6,000 lampshades a month with monthly turnover topping RMB500,000. Increased sales revenues have led to a corresponding increase in weavers’ wages, from RMB300 a month in the past to RMB3,000 today.

Currently, the company’s bamboo handicrafts are sold mainly to farms, tourist attractions, and restaurants. Wan Xue’s next move is to introduce the needed equipment and technology, enabling items such as bamboo sandals and chairs to be made in Nanchong.

She is also preparing to build a bamboo culture museum in Nanchong to publicize and sell bamboo artworks. Here, visitors will be able to have hands-on experience of the processes involved in bamboo weaving.

It is worth mentioning that most employees of Wan Xue’s company are stay-at-home women and old people of Banzhu Township, most of them with disabilities. She says she has been in the business for 27 years without ever thinking of giving up, not even in the most difficult early days of her company. She sees her future as continuing to lead people to grow the bamboo weaving industry, expanding and strengthening it.

Conjuring Art from Waste Bamboo

Mr. Zhou Guixin, a bamboo carving craftsman from Dongyang



Is it possible to take a piece of discarded bamboo and turn it into something of value? Perhaps something that surpasses the essence of bamboo itself? An artisan of Dongyang, Zhejiang Province, has turned traditional perceptions of bamboo carving on its head. He is no young rebel artist, but a literary-minded and creative craftsman born in the 1970s. His name is Zhou Guixin.

On August 6, 2016, an exhibition of bamboo stem and bamboo root handicrafts was held in Sanfentang Art Gallery in Dongyang. The various artefacts, in a multiplicity of forms and postures, seemed to dance with life. They were elegant and delicate, a style very much at odds with the plain and unsophisticated look of traditional bamboo carving.

Those exhibits displayed the development of Zhou's art ideology. "From these hundred-plus carved bamboo items it's clear that my technique and subject matter are traditional. But their shapes and expressive forms are a clear break with tradition. What I'm trying to explore in my bamboo sculpture is to create a Dongyang style," he explained.

Delicate and Elegant Bamboo Handicrafts

In terms of material, bamboo carving is divided into three categories, namely stem carving, root carving and Fanhuang carving (carving bamboo on the basis of its own natural color of ivory). Zhou Guixin chiefly works on bamboo roots, which grow deep underground.

"Roots are the hardest part of the bamboo plant. They can break through the toughest of obstacles underground, piercing their way between earth and stones and the roots of other plants. Their life burrowing underground results in a huge variety of root shapes, providing artists with plenty of space for creative intervention." For 20 years of his artistic life, Zhou Guixin preferred to work with bamboo roots than stems.

“One can innovate in techniques and materials. I’d experimented with different techniques; could I break out of the box and do something with a different material?” Zhou switched his gaze to bamboo stems, discovering a special linear tension at the branches growing from joints on the stem.

To know more about composition, Zhou often refers to classic albums of painting. “The line is the essence of Chinese painting; and also a special system that stands apart from the block carving of Western sculptural art. In bamboo, it is the branches that are the clearest expression of linearity.” In Zhou’s view, bamboo branches are the expression of line, and the dagger-like leaves are like free-hand downward strokes in Chinese painting.

Driven on by this mixture of classical and modern art impressions, Zhou set about studying bamboo branches. After bleaching them, he removed the bark and joints; then, copying the folk craft method, he gently baked the branches and twisted them around his fingers, turning straight branches into soft curvaceous forms. It was a total transformation of these once towering trees. In his skillful hands, the leaves were cut into tiny pieces to become leaves the size of peas and flowers the size of rice grains. They became a work of art, frozen in time for ever.

But Zhou could no longer confine his creativity to trees. Could his philosophically driven artistic conception go further? Accordingly, he would cut out a butterfly shape and attached it to the “leaf” or created monkeys climbing in the “tree.” With this, the lofty bamboo suddenly became jaunty and fresh...

A World in Microcosm

Traditionally, the form of a bamboo carving is determined by the size of the plant’s root. Some roots are as small as a man’s fist.

Inside the gallery there are carvings ranging from a meter wide, down to one foot. *Twelve Beauties in the Red Mansions* is carved on a one-meter-long bamboo root split into two equal size parts. *Farm in Jiangnan* reflects traditional farming life in Dongyang. It is an assembled piece made up of over one hundred figures and household items, individually carved on bamboo and then put together as a complete work 13 meters long. It occupies one room all on its own.

After the crowd at the opening ceremony has dispersed, Zhou picks out one object. It is just the size of a cigarette lighter, but the grasshopper on it is depicted in fine and vivid detail.

Zhou cuts and splits bamboos horizontally at random, then checks the cross section structures and picks out of the strangest one. “The natural curving structure, only a few inches long, is obviously caused by excessive bending of the bamboo,” he explains. The longer he observes these structures the more they mean to him, seeing them as potential leaves, butterflies, gourds, vines or other items. The idea of the seal carved with a grasshopper emerged quite naturally.

“I rub the joints and decorate the lines to bring out the shape of gourds, fruits, and beans. The mottling and skin texture on bamboo joints are very similar to those on gourds, so the dark part can be carved to look like a pedicles or insects.” Very often, he drafts on scrap bamboo until the pattern fits the bamboo section.

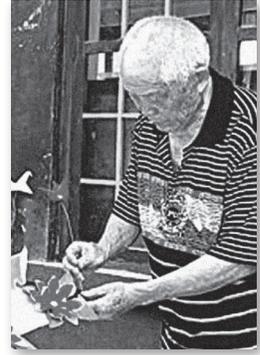
“Sure, bamboo is a cheap material, but it is a gift of nature and should be approached with a respectful heart.” It is such respect and care that gives renewed life to this discarded bamboo.

At the 2014 Zhejiang Province Crafts Fair, Mr. Zhou was awarded a gold medal for his bamboo carving series which so well represent the soul of Zen.

“Imitation is an instinct for making profits whereas innovation is a motivation to transcend one’s subjective limitations. My pursuit of these things is proving how right Auguste Rodin was in saying, ‘Beauty is everywhere. It is not that she is lacking to our eye, but our eyes which fail to perceive her.’” The sincerity of this 41-year-old craftsman is plain to see: the pursuit of beauty is where creativity lies.

Sixty Years of Crafting Bamboo

Mr. Yuan Guanwen, a bamboo craftsman of Sichuan



In Qingdi Township, Shehong, Sichuan Province, there are two traditional festivals that are particularly fun and animated. One is the Dragon Boat Launch Day, held on the 20th day of the fifth month by the lunar calendar, when it is “a must” to float hand-made dragon boats. The other is the Lantern Festival on the 15th day of the first lunar month, when villages perform a grand fire dragon dance at night to the accompaniment of molten iron fireworks.

The most eye-catching things on these occasions are the famous dragon boat and the dancing fire dragon, both of them created by the craftsman, Yuan Guanwen, now 84 years old. He has been making these things for at least 60 years.

This skillful craftsman was not born into an artisan family, but he took an interest in these arts at a very young age. “As a kid we had a neighbor who wove crafts for a living. He made many objects, baskets, dustpans, and the like, in various forms.” To the young Yuan, the craftsman was a magician who could conjure bamboo plants into any object you wanted. Almost every day, he would go watch the craftsman at work and, once done, he would cut down some bamboo, and take it home to practice splitting it into strips from which to weave his own little items.

“Those first works were a mess. But I loved doing it so I didn’t give up.” Yuan smiles as he reminisces. He kept up his hobby for decades, never abandoning it, doing it in time off from his day job of towing cargo boats. The things he made were so fine and lifelike that many villagers asked him to make things for them.

“The Spring Festival and Dragon Boat Festival are the busiest seasons in a year. Temple fairs and dragon-boat launch can’t do without dragon lanterns and dragon boats,” says Yuan. Sure, he can make bamboo carriers and dustpans too, but it’s his dragons that are in greatest demand.

How a Few Bamboo Strips Become a Boat

Though in his eighties, Yuan Guanwen uses his words and skills to great effect. According to him, the dragon is a totem of the Chinese nation, and nothing gives him greater satisfaction than creating a fine dragon. The dragon boats were not big ones but they took plenty of his time because he made every element of the boats.

Yuan describes the three processes involved in making a dragon boat: first, bamboo bark is chopped and split into narrow strips; next, those strips are to make a framework, a skeleton; then, the framework is covered with paper and the dragon image painted on. The paper-covered dragon is painted with white glue and allowed to dry and harden off. The finishing touch is to dot in the eyes and paint the scales to bring it to life.

The process is easier said than done, and it calls for a great commitment of time. Yuan and another veteran craftsman in the village are the only ones capable of making bamboo dragon boats, so almost all the boats are his handiwork. For each festival, he has to make nearly a hundred boats. In order to produce good work, he starts preparing months in advance. "As the saying goes, 'slow-growing trees bear the best fruit.' The more time I can give to the work; the better boat I can produce." He usually designs a dragon and practices several times on draft paper until he is efficient enough to paint a vivid dragon.

As well as dragon boat images, Mr. Yuan introduces other popular images such as the Eight Immortals in the legend of *The Eight Immortals Crossing the Sea*, the bodhisattva Guanyin or the Goddess of Mercy, and the tutelary deity Nezha. In advance, he reads many stories about these characters, in order to better understand them and make their figures as lifelike as possible in the final work.

The body of the fire dragon in Molten Iron Fireworks Performance, the famous Qingdi Township intangible cultural heritage, is made by Yuan himself. Compared to making dragon boats, this fire dragon involves a more stringent selection of materials. Its head, body, and tail are all hand-made. He is even more exacting about the size of the fire dragon, not an inch too short or too long, otherwise it will be hard to maneuver in the performance. The most challenging element is the dragon head, which usually takes him three days to make.

A Gap in Demand for Apprentices

Mr. Yuan has made fire dragons and dragon boats for 60 years. In this old man's hands a few pieces of bamboo magically shape-shift into dragons or boats, to the great delight of locals. But he seems downcast when talking about this traditional skill, concerned that, once his generation has passed, there will be no one left to make these items.

Society has changed; people live different lives and the place of traditional craft skills have changed alongside. Mr. Yuan worries about the future of this craft and

the passing of his skill to new generation, because few young people want to learn this complicated art that takes so long to master. In pursuit of high speed and high efficiency, young people are not attracted to it.

What worries him is that once he passes on, there will be no one in the town to make these traditional items and that they will have to be bought in from elsewhere. The current state of affairs depresses him, but he still hopes that inheritors may present themselves and if that happens, he is more than willing to teach them, lest this traditional handicraft should be lost.

A Bamboo Craftsman and His Bamboo Bike

Mr. Yu Yunsheng, a bamboo craftsman of Chun'an, Zhejiang Province



If you were given several freshly felled bamboos and asked to make a rideable bike from these, complete with basket, brakes, chain, a bike that is both solid and good looking...could you do it?

Yu Yunsheng, 53 years old, 38 years of experience and skills in bamboo to the task. Within just 80 hours he fashioned such a bamboo bike.

Starting to Make Crafts at 15

Dashu Town, in the southwest of Chun'an County, has been dubbed "Hangzhou's most beautiful land of bamboo." The rolling green hills that surround Dashu are thickly clad with flourishing bamboos. For hundreds of years, local household items, from baskets and sieves to beds and chairs, have been made of bamboo, and making such items provided a living for craftsmen.

Yu grew up around craftsmen working with bamboo. A smart kid, out of school he would dash off to the workshops and pick up some skills. His family was poor and could not afford for him to continue in school so he dropped out of education at the age of 15. He told his parents, "I want to be a bamboo craftsman." The very next day he got apprenticed to a veteran craftsman.

"It was tough work. You have to man up. I worked from early morning till dark. In every season of the year apart from the busy farming season, I followed my teacher making bamboo products far from home." According to him, the most challenging skill, and one that took him nearly two years to master, was the basic skill of splitting the bamboo into strips.

From decades of wielding a knife, Yu's hands are full of scars, and his left hand does not fully extend. Even so, it takes him just 10 minutes to cut a piece of thick bamboo and split it into 72 slivers, "as narrow as hair."

Going Independent After Three-Year Apprenticeship

Yu was a quick learner and a hard worker. Within three years he could make all necessary apprentice pieces, from a little bamboo cup to a large bamboo sieve. He was ready to strike out on his own.

“There were nearly a hundred bamboo craftsmen working in Dashu at the time, so to avoid going into competition with those masters, I decided to head off far away to seek a living,” Yu recalls.

“At that time, so many household articles were made out of bamboo; from cups to rice-strainers, bamboo was an essential part of daily living.” Seven years into his trade, Yu Yunsheng got married. “Everyone admired me because I made money and lived a happy life.” As he says this, Yu’s eyes are filled with happiness.

Bamboo craftsmen agree that the 1990s were a watershed in their fortunes. “Bamboo cups were replaced by plastic cups, and bamboo basins by metal ones. We were losing business. Without enough work to sustain them, craftsmen had to find other work to make a living.”

In common with others, Yu Yunsheng had to find odd jobs to support his family. But no matter how tired he was, he would spend about two hours working with bamboo and enjoy himself enormously creating things. He feels a duty to keep the heritage alive for future generations.

“My Worst Fear Is Being One of the Last Craftsmen in Town.”

These days, Yu Yunsheng does not make a living from making bamboo products, but he has not lost his skills.

Talking about his bamboo bicycle, “The most difficult part is to make the chain. Each strip of bamboo has to be planned to exactly the same thickness, otherwise the links won’t hold.” Over half of the total 80 hours was spent on getting the chain links right. A bike of such high quality commands a correspondingly high price, enough to buy several conventional bikes.

“These days, our young people are away doing casual work in the cities and there are no more than 50 craftsmen left in town. But two-thirds of them are over 60 years old and the youngest is in his fifties.” Yu worries deeply about the future of this craft and the lack of young people to perpetuate it.

But he does see some reason for hope. Over the last few years the local government has gradually introduced policies on passing down traditional folk crafts. These policies include not only deep processing of bamboo but also establishing handcrafts cooperatives with e-commerce platforms. “In the past, we craftsmen were paid only for our labor, but now we sell directly on-line for ourselves and can make more money.” These days he usually makes a few pieces and puts them up on the web for sale.

These days the bamboo industry in Dashu is booming. There are 43,000 *mu*

(2,867 hectares) of bamboos under cultivation, and four new processing enterprises producing bamboo floors, bedding, and crafts. By 2017 there will be five villages making bamboo brooms, with an annual output of 300,000 brooms.

In 2016, the G20 Summit was held in Hangzhou. As part of the welcome effort, Yu Yunsheng spent 16 days making a “G20” bamboo boat. All the fine details and motifs adorning the boat were created by his hands, carrying the hope that his hometown will open to the world, just like this boat opens its sails to voyage far. The boat has a deeper symbolic meaning, according to the veteran craftsman: “I hope that this bamboo craft profession of ours can voyage far, even farther than this boat!”

Scientific Cultivation of Bamboo Shoots Puts Growers on the Road to Riches



Ms. Liu Caifeng, leader of the Lüfeng Bamboo Shoot Specialist Cooperative of Hangzhou, Zhejiang

At the Ninth China Yiwu International Forest Products Expo in 2016, exhibitors from Hangzhou made outstanding achievements, with 20 enterprises winning gold medals, and 25 enterprises gaining recognition with quality awards. The “Zuixiangchun” brand of Lüfeng Bamboo Specialist Cooperative of Hangzhou, headed by Liu Caifeng, won a gold medal.

Carrying 3,000 Seedlings Uphill on a Shoulder Pole

Until the year 2000, Niutou Hill in the southwestern corner of Tangbu Village in the town of Pingyao, Yuhang District in Hangzhou was bleak and overgrown with weeds. That same year, Tangbu Village put up more than 100 *mu* (66,700 sq m) of wasteland on Niutou Hill for household contracting projects. Liu Caifeng and her husband believed that growing bamboo shoots on the hill would be a good route into entrepreneurship; they put in the highest bid and acquired a 30-year contract on this land.

With the support of their families, the couple embarked on the reclamation of the barren hill located far from the village and overgrown with weeds. After a period of hard graft, the time came to plant their 3,000 bamboo seedlings that they carried up the hill on a shoulder pole. They remained on the hill day and night, working from dawn to dusk, planting the seedlings one by one and nurturing them like they were their new-born babies. Their first bamboo shoot harvest came in 2004, and though the quantities were small it was enough of a harvest to elicit a contented smile from the couple.

Scientific Cultivation in a Second Effort

Entrepreneurship has never been an easy ride. As their toil to reclaim the wilderness continued, they planted across an even wider area. Eager to see quick results in her

initial venture, Liu Caifeng mistakenly believed that planting the seedlings more densely and the use of more expensive fertilizer would automatically lead to a higher yield. This thinking led to soil acidity and degradation, and to degeneration of the bamboo groves. Their painstaking efforts had gone down the drain.

Unfazed by the hard realities of bamboo farming, Liu Caifeng and her family pulled themselves together and sought advice from different farming experts. Instructed by experts in the Bamboo Industry Association, they started a new round of entrepreneurship by embracing ecological cultivation of bamboo shoots, an approach centered on the “use of lime, upgrading soil quality, moving to bio-fertilizer, and protecting the bamboo groves.” In July 2012, the Lüfeng Bamboo Shoot Specialist Cooperative of Hangzhou was established and the “Zuixiangchun” trademark was registered.

In recent years, through the use of new farming techniques such as soil improvement, retention of source stock, covering of emergent shoots, and rejuvenating decayed bamboo groves, a bamboo forest has been created, and a forest of quality deep-rooted bamboo shoots has grown, producing a high yield of up to 1.5 tons per *mu*.

“Last year, there was a drastic cold spell, and in many other places bamboo yields plummeted, down by 30 to 40 percent, but the frost did not damage my bamboo and the yield was stable. This fact shows that we made the right decision in taking the path of scientific cultivation,” says Liu.

Business Diversification by Raising Chickens Among the Bamboo

In 2009, while still growing bamboo shoots to pursue their dream of entrepreneurship, Liu happened to get help from some fellow villagers who raised chickens. They helped them begin raising free-range chickens on their bamboo groves as the base. “My family and I started thinking about how to take advantage of what we have and make full use of our existing resources to have an earth-friendly agriculture. The chickens in our base could use the whole forest as their foraging ground while making it more fertile with their droppings.” This green eco-farming approach reduced the running costs as well as producing good bamboo shoots. Now, Niutou Hill products range from spring bamboo shoots and charcoal-dried bamboo shoots to free-range chickens and eggs as well as organic vegetables. Because of the reputation of their organic products, their customers returned time after time, and this loyal customer base helped their business prosper.

Now, all of Liu Caifeng’s family live and work on the hill. “The bamboos here are as old as I am.” At the mention of her son who is already working in the business, Liu Caifeng’s eyes shine with pride. “My son told me that with the Internet being so developed, we could sell on our bamboo shoots on WeChat, so I now do business on this app, expanding sales of fresh and dried bamboo shoots and chickens among my

circle of friends. Now, our order book is full and my husband and I often work late and don't go to bed until the early hours. Yes, I'm tired but very happy too."

Over the years, many farmers like Liu Caifeng have received assistance from the Bamboo Industry Association of Yuhang and become affluent through scientific cultivation of bamboo shoots. Since its establishment over 20 years ago, the association has rallied behind its scientific and technical workers in the bamboo industry and model farming households in agriculture and forestry in the villages and townships of the production area. They have also taken the lead in introducing, testing, demonstrating and diffusing the technology of producing high-yield early bamboo shoots and, when necessary, producing them out of season. Consequently, the association has played an active role in guiding the farmers to expanding the cultivation area and raising yields per unit. Satisfaction and gratitude are written on Liu Caifeng's face when talking about the association.

Years of hard work have rewarded Liu Caifeng with various honors. In March 2013, she was awarded the title of March 8 Red-Banner Pacesetter of Yuhang District and the same title in the city of Hangzhou in March 2014. In December that year, she became head of the Bamboo Shoot Cultivation Sub-Association of the Bamboo Industry Association of Yuhang District, Hangzhou, and deputy secretary-general of the Bamboo Shoot Farmers' Service Center of the Bamboo Industry Association. As well as all this, she also obtained the title of Senior Farmer Technician.

Weaving a Beautiful Life with Bamboo

Ms. Yao Youfeng, head of Guizhou Libo Maolan Karst Specialist Bamboo Crafts Cooperative



When the rest of her family went to the cities as migrant workers, Yao Youfeng stayed behind in Lianhe Village, earning money to help out with the family expenses, but now she has established her own brands and cooperative. Her legendary entrepreneurial feat attracted wide media attention, but it also drew the notice of the International Network for Bamboo and Rattan (INBAR). Dr. Hans Friederich, director-general of INBAR, visited Yao's store in Libo where Yao shared her love for bamboo.

Yao Youfeng was born into a poor family in Yaosuo Village of Dongtang Township, Libo County, in Guizhou Province. She had been working away from home but returned to Libo for Chinese New Year in 2009. She was pondering what to do next when the news came that Maolan Nature Reserve Administration was organizing people to sign up for a training course in bamboo weaving art in the neighboring province of Sichuan.

Yao saw this as a great opportunity. In February, she went, with another 19 outstanding trainees, to Sichuan for training.

During the training, Yao felt a deep attraction to the world of bamboo weaving; the more she mastered the skills, the wider her horizons opened. She visited China's and even the world's largest bamboo weaving city, and had the good fortune to see the international bamboo weaving master Chen Yunhua and appreciate his works.

In July 2009, once the training was over, Yao Youfeng and her partners registered Libo Maolan Karst Specialist Bamboo Crafts Cooperative. In the initial stage when there was no income, cooperative members melted away, leaving only Yao Youfeng and three other members hanging on in.

It was not until October 2009 that they made their first money: someone bought 12 small items! However, the first bucket of gold was no first sign of a golden future for their venture. In order to expand the cooperative, Yao Youfeng and her team

turned for help to ICBR, and hired Chen Yunhua and two senior bamboo weaving teachers to give them technical guidance.

But the market outlook was not optimistic. And when this training was over, only one trainee chose to stay on. Yao Youfeng and her entrepreneurial sisters began to do part-time jobs, weaving at night to keep the cooperative alive. In spring 2010, at the Libo Plum Blossom Festival, a visitor bought from Yao bamboo woven pictures to the value of RMB10,000. It revived hope in Yao's disappointed heart.

Things began to look up; bamboo woven products seemed to take on greater appeal, pictures being chosen by visitors as favored souvenirs. In September 2010, Yao Youfeng went to Sichuan again, this time for an intensive course in weaving technique. As soon as the 60-day course was over, she returned home to prepare her own bamboo craft training class. Over a series of training sessions, the strength of the cooperative reached 35 regular members.

But 2014 brought another major challenge. The Libo area embarked on a program of road maintenance that caused traffic disruption; this had a severe impact on tourism, with a knock-on impact on Yao's handicraft sales. As a result, the main producers of the cooperative shifted their focus to taking care of family, gradually giving up the business. The total turnover for 2014 was only RMB82,000, realizing a profit of RMB35,000. This paltry income was another cruel blow for Yao Youfeng's entrepreneurial zeal.

Yao Youfeng began to reflect on the imperfections during her five years as an entrepreneur. Obsolete ideas in the cooperative made it impossible to catch up with industry development; lack of product innovation made it difficult to cater to the market; the management of the cooperative was in a slightly disordered state; lack of clarity regarding the rights and obligations of business partners gave rise to a lack of collective responsibility; the single sales channel and weak professional ability...a multiplicity of problems occurred to her. Fortunately, Yao is good at making improvements. Undeterred, she was determined to overcome those difficulties one by one.

In July 2014, the director-general of INBAR, Dr. Hans Friederich came with a group to Guizhou and visited Yao Youfeng's cooperative, giving heartfelt care. This breathed new courage into Yao, who set about getting a loan of RMB40,000 for a retail outlet. With a fixed place for production and sales, performance began to improve. Meanwhile, Yao successfully registered her trademark "Maolan Bamboo Craft," making bamboo woven pictures carrying that logo. In addition, Yao allied with Libo Bureau of Industry and Information Technology, jointly holding elementary classes in planar bamboo weaving for rural workers to further expand the cooperative.

Yao is candid about being tempted to give up during the extremely difficult times, but she could never forget her initial entrepreneurial dream. Looking back upon her

venture, happiness and disappointment have often been travel companions. As her weaving technique improved, some personal growth took place. She expressed as much in *A Letter to the International Center for Bamboo and Rattan*: “I have always believed I can do better and better. Even if others give up, I will persist. Even if my performance is not good enough right now, if I persist, it may well get better!”

Yao believes that provided that you firmly persist, dreams will eventually come true.

A Willing Learner in the Leizhu Business

Mr. Tong Miaosheng, a bamboo farmer of Fenshui Town, Tonglu County, Zhejiang Province



Asked about the origins of his interest in Leizhu bamboo, a species grown for its edible shoots, Tong Miaosheng, a bamboo farmer of Fenshui Town, Tonglu County, Zhejiang Province, said it went back to 1998 when he contracted nearly 100 *mu* (1 *mu* equals 666.7 sq m) of hilly forest. Initially he grew soybeans and watermelons there, but the returns were meager. In order to extract a profit out of the forest, and following the maxim of “growing whatever may bring a good return,” Tong set his sights on Leizhu.

After planting this species over a dozen or so *mu*, the well-connected Tong learned from a friend in Lin’an County that mulching can greatly increase bamboo shoot yield and, with it, family income. A quick-witted person such as he needed no second telling. He went to Lin’an at once to learn how. On his return, he started right away with experimental mulching of his plants.

From one *mu* of trial mulching, the area mulched each year grew to 10-plus *mu*, and Tong Miaosheng’s reputation as an able person spread far and wide, because every year after mulching his forest produced more and better bamboo shoots than other farmers, and sooner. Naturally, they command a higher price.

Fourteen years ago, yield of bamboo shoots was over 1,000 kg per *mu*, generating a net income of RMB10,000; now, over 10 *mu* a year are mulched, generating an output of 25,000 to 30,000 kg of bamboo shoots and sales revenue of RMB300,000. Even when input costs of RMB10,000 per *mu* are deducted, this still gives a net income of RMB50,000 per *mu*. Tong’s reputation as a successful bamboo farmer has been firmly established. Thanks to their good color, big size and delicious flavor, bamboo shoots from Tong Miaosheng have a brand effect, and usually sell for RMB3 to 5 more than those of other farmers. Furthermore, rather than having to go to markets to sell, clients come to his base to buy them. Besides, every year, throngs of forestry experts and bamboo farmers come from afar to learn from him, attracted by

the claim that “bamboo shoots here can be eaten raw.”

On the topic of maintaining the current output of 2,500 kg per *mu*, Tong shares his experience generously. First, the Leizhu plantation here is situated next to the reservoir on the Fenshui River, a location that provides rich soil and an ideal growing environment; in his words, the best place for budding shoots. Secondly, measures such as keeping back some bamboo shoots in order to nurture the bamboo plant, irrigation, the use of fertilizer, and pest control, all play a positive role.

Of course, in our view, his years of technical exploration have been crucial. Tong and his wife have tested many substances for their potential as mulch material — from bamboo sawdust to wheat chaff. Step by step, by trial and error, varying the mulch material, the thickness of the cover, the ideal length of time under mulch, and the optimal use of water and fertilizer, they have arrived at the best method. They experimented with rice straw as mulch, only to find it too costly and tiresome, not as economical as wheat chaff. As to why bamboo leaves are not used, Tong has this to say. Firstly, bamboo leaves are bulky and cumbersome and therefore present a deposit problem. A second and more important reason is that bamboo shoots grown beneath a mulch of bamboo leaves have a shorter shelf life than those grown under rice straw or wheat husk, and, in the former case, bamboo shoots dug in the morning often turn black by the evening, making a high price impossible.

Hard work has always been the couple’s secret to success. Over 10 years earlier, the mountains here lay waste and “moribund.” Starting from their initial 10 *mu*, they toiled year in year out, working their fingers to the bone. Now, Tong Miaosheng has over 100 *mu* of bamboo forest under his name and his cooperative has over 300 *mu*.

Judging from their present income and yield per *mu*, the couple must have worked much harder than we can imagine. The various essential tasks keep them occupied all year round, such as soil coverage, felling, scarifying and mulching. For help with felling and soil coverage they hire casual labor, but when the time comes to get in the bamboo shoots, the couple work alone throughout the harvest. They get up at first light and by the end of day will have dug several hundred kilos of bamboo shoots. Asked by farmers nearby how just the two of them can manage alone to harvest bamboo shoots from dozens of *mu*, Tong says that it’s all down to practice making perfect.

Tong’s dedication to Leizhu bamboo has made him wealthy, and his guidance has also brought wealth to many farmers around. The once untended hillsides have become treasure chests. More and more farmers have followed Tong’s new path to riches, and the evidence is there to see in the form of new houses built and new cars bought.

For some years a local farmer in Lin’an had failed to achieve the predicted output, even after quite a period of mulching his plants. Someone recommended he consult Tong Miaosheng. Tong’s experience enabled him immediately to drill down to the

reason — the mulch was being applied too early and was preventing high yields. After adjusting the timing, the farmer's bamboo shoot yield rose to the ideal level.

One good turn deserves another. In gratitude for Tong's unstinting help, the farmers also share with him any business news they know. Every year, in the harvest season, those who live near the market keep him posted daily on the highest prevailing price there so that his fresh bamboo shoots can always fetch the optimal price. "The farmers around here say that if they follow his advice in selling bamboo shoots, they can make several thousand RMB more per *mu* than others," says Tong's wife with a smile.

Tong says in future he wishes to learn more advanced technology and get higher profits at lower costs, while striving harder to build his own brand and push forward his cause of Leizhu mulching.

From Farmer to Bamboo Shoot Boss

Mr. Jiang Daihai, general manager of Wangtong Bamboo Shoot Co., Ltd. of Yong'an, Fujian Province



He wears a no-nonsense crew cut, and has an honest and simple look about him. He is Jiang Daihai, a villager of Zhangjing Village, Gongchuan Township, Yong'an, Fujian Province. Once a bamboo grower producing just enough to cover living expenses, after years of effort, he is now a bamboo shoot merchant with quite a name in the area.

Finding a Market Niche for Dried Bamboo Shoots

Jiang heard from his elders that, 360 years ago, his ancestor Jiang Tingzong dug up fresh bamboo shoots, dried them and sold them for cash. During the Republic of China period, his great grandfather Jiang Shanghai would ship dried bamboo shoots via Fuzhou for sale in Zhejiang Province and Shanghai.

Jiang was determined that the Jiang tradition, his forefathers' hard toil to sell dried bamboo shoots beyond their local area, should not be lost. There were 8,000 *mu* (533 hectares) of bamboo forest in Zhangjing and the annual yield of dried bamboo shoots exceeded 70,000 kg. Some were purchased by outsiders coming to buy, and some villages would occasionally sell a kilo or two at local fairs. The small-volume sales resulted in extensive overstocking.

How to boost sales of dried bamboo shoots? Jiang took the path of brand marketing. In 2003, he began to investigate the market and took a tour of cities where dried bamboo shoots enjoyed large sales. He then registered Yong'an Wangtong Bamboo Shoots Co., Ltd. His sales model was "company-farmer" cooperation. Each year his company would purchase all the dried bamboo shoots from villagers for onward sale. For a few years, sales conditions were good, every bamboo shoot was sold, and his enterprise earned him the first bucket of gold. However, in 2015, his business was affected by changes in the market and he hardly made a cent. He turned to self-reflection. Subsequently he developed new products to meet the needs of

the market and promoted three tiers of boiled dried bamboo shoots and rehydrated dried bamboo shoots. Ever since, his company has had the capacity to supply the market with varieties of bamboo shoots all year around.

Jiang says, “With the right sales channels opened, villagers’ dried bamboo shoots sell easily.” In September 2015, he registered his company’s trademark as “Xiongjingshan,” the name of a mountain overlooking the village. Meantime, his wife Jiang Guiqin took an e-commerce “incubator” training class run by Yong’an Municipal Bureau of Commerce, and registered the “Xiongjingshan Agricultural and Sideline Products Store” on Taobao, China’s biggest e-commerce platform.

Developing New Products to Satisfy Consumers’ Needs

Running a business is never plain sailing; that is particularly true for selling dried bamboo shoots, which is vulnerable to market volatility. Taking one’s eye off the ball may spell the end of a business. Jiang’s guiding principle is that you have to meet consumers’ needs.

Jiang had been a wholesaler of dried bamboo shoots for 13 years. In 2014, given the market boom of two years previously, he invested heavily in buying up dried bamboo shoots. However, due to changes in market supply and demand, he was obliged to sell them all cheaply, at RMB6 per kg less than the purchase price. The resultant loss was several hundred thousand RMB. For a long time thereafter, business remained slack and many dealers in dried bamboo shoots dropped out, one after the other. Jiang, however, stayed put, set about investigating consumers’ needs, tracking down prospects and thinking about ways of expanding sales.

In a talk with a client, Jiang spotted new business opportunities. Many Northern Chinese haven’t got a clue how to cook dried bamboo shoots, and those who do know a bit about it think it time-consuming and troublesome. Before being fried, the shoots must be soaked in water for a long time. Putting himself in consumers’ shoes, Jiang processed the shoots, bagging them and sealing the bags so that consumers can open them and fry the rehydrated shoots.

“Putting consumers’ needs first” broadened Jiang’s sales of bamboo products. They were sold to Zhejiang, Hunan, and Hainan provinces and Shanghai. They were also exported overseas. Meanwhile, in order for distant consumers to enjoy his bamboo shoots, he took advantage of the rapidly expanding express logistics, and put his products online for sale.

Jiang’s Way to Keep His Dealers

As Jiang puts it, “If consumers are my God, then my dealers are my brothers.” In the past two years, as bamboo business has been difficult, some of his dealers have suffered much from poor sales and defaulted.

A case in point is Mr. Wang from Zhejiang Province, a dealer who owed Jiang

RMB350,000 due to the unfavorable market situation and the resultant poor cash flow. After learning the truth, Jiang offered to share some of Wang's market risk and cut his bill by RMB15,000.

Jiang firmly believes that, over and above sticking to an ethical code of conduct, it is important to take into account the interests of dealers, which will surely promote sales. Ultimately this will lead to a mutually beneficial result.

Jiang is right. Jiang's company has been developing fast while many bamboo businessmen have moved on to other businesses.

A Disabled Youth's Road to Entrepreneurship

Mr. Wang Jianwen, director-general of Wuming Moso Bamboo Cooperative in Anfu County, Jiangxi Province



“Entrepreneurship is the best way to live. Not only can it let us put an end to poverty, it also allows us to maximize our self fulfilment.” These were the words of Wang Jianwen, director-general of Wuming Moso Bamboo Cooperative, a disabled youth from Zhangzhuang Village of Zhangzhuang Town, Anfu County, Jiangxi Province, when he first expressed his intention of starting up a business. In 2015, the average income per household of his cooperative exceeded RMB32,000. Within just a few years, Wang has made bamboo the source of wealth for the start-up.

Physically Disabled but Mentally Tough — Returning Home to Start a Business

Wang Jianwen was born in a remote mountain village 37 years ago. Unfortunately, a serious illness led to muscle atrophy in his right leg, disabling him and depriving him of a happy carefree childhood. However, making his own living was Wang's aspiration and driving force.

Where to start the business? The first place that occurred to Wang Jianwen was his native Anfu County, an area where Moso bamboo was abundant. However, due to the remote location and inconvenient transportation, most of the county's bamboo groves had fallen into neglect; unwanted, they had been left to fend for themselves, becoming sickly and weak.

Starting up back in his hometown would not only make full use of Anfu's rich bamboo resources but also help its people out of poverty. In 2002, Wang Jianwen went back to his hometown, taking over RMB1.3 million that he had saved little by little when doing business. This he used to contract a 2,200 *mu* (146.6 hectares) area of residual bamboo forest for his planned bamboo business, in the teeth of great opposition from his family and skeptical mutterings from the villagers.

Technology, the First Thing for Overcoming Difficulties

Once the contract was signed, the number one problem facing Wang was difficulty of access. As the Moso bamboo forest lies deep in the mountains, the long distance and tough roads of the remote county presented a great challenge. The existing roads were narrow and needed widening, and production facilities had to be built. Should he battle against all these difficulties, or give up? For Wang, a decision made is like an arrow — once released from the bow there is no turning back. He would be like Yu Gong, the “foolish” old man of Chinese folklore who successfully moved a mountain, a little at a time. First, he invested his RMB140,000 in constructing a 4.5 km-long forest road from Huxi to Huang Mao Qiu Forest. Then, he raised more than RMB2 million to build a 10 km-long cement road from Zhangzhuang to Huxi. These measures facilitated the transportation of bamboo, but also made it easier for the villagers to come in and out of the county. This won their great gratitude.

Cultivation technology is the key to Moso bamboo fertility. For this, Wang Jianwen promptly consulted technicians at the local forestry workstation and in the Zhangzhuang Sub-Station of Ming Yue Mountain Forestry Station. He participated whole-heartedly in technical training relating to bamboo fertility, and subscribed to sci-tech publications at his own expense to further educate himself in bamboo farming. Thanks to his unremitting efforts, the formerly neglected 2,200 *mu* low-yielding forest became an enviable high-yielding Moso bamboo forest. The number of bamboo plants has grown from the original 160,000 to more than 370,000, the original density of 80 plants per *mu* is now 180 per *mu*, the average pole diameter has increased from 8 cm to 14 cm, and the annual output of standard bamboo has risen from fewer than 20,000 to over 50,000 poles. As a result, the once ignored forest has finally become a “magic money tree” bringing fortune to the villagers.

Go for Size and Strength to Shake off Poverty and Achieve Prosperity

While Wang Jianwen’s bamboo business was going from strength to strength, Anfu County started a major comprehensive project to speed up bamboo industry development. The county government issued the Decision on Accelerating the Development of Bamboo Industry, and set up a bamboo industry development fund. The bamboo industry project boosted financial support for transforming low-yield plantations and for forest road construction. Wang Jianwen was greatly enthused by these measures.

Wang Jianwen’s Moso bamboo industry became bigger and stronger, changing the “poor bamboo mountain” into a “rich bamboo mountain.” By 2005, the bamboo forest he owned or leased was over 5,000 *mu* (333.3 hectares). With a successful loan of RMB500,000, the rough 10 km-long forest road was widened. Since 2014, with support from the county’s finance and forestry departments and the disabled

persons' federation, a 33 km-long bamboo highway was built in order to optimize transportation conditions for a bigger and stronger bamboo industry.

With infrastructure built, Wang Jianwen led people out of poverty. In 2011, he took the lead in establishing the Wuming Moso Bamboo Cooperative, a group of 18 households engaged in bamboo cultivation, production, and operation. The joint capital amounted to more than RMB3 million, and more than 10 families with disabled persons joined free of charge. That same year, the cooperative and some processing enterprises invested RMB600,000 in partnership to establish a deep bamboo processing base in Zhangzhuang Village.

Currently, the cooperative business has an operational area of 15,000 *mu* (1,000 hectares). In the last two years, the cooperative has successfully transformed a low-yielding plantation with an area of 5,500 *mu* (366.6 hectares) and cultivated a high-yielding demonstration forest with an area of 200 *mu* (13.3 hectares). At the same time, through in-depth cooperation with bamboo industry enterprises, much has developed in Anfu County since then. Having a specialized cooperative platform, Wang Jianwen has provided local forest farmers with Moso bamboo planting techniques and services, motivating all forest farmers in the village to plant and cultivate bamboo for the development of the bamboo industry throughout the township. Today, the area of Moso bamboo forest owned or leased by Wang exceeds 8,000 *mu* (533.3 hectares), with an annual production of 300,000 bamboo canes and an annual income surpassing RMB4 million.

As the benefits of bamboo continue to grow, more and more villagers turn their attention to the bamboo-clad hills, anticipating that bamboo will open a path to prosperity for them. As their leader Wang Jianwen says, "If you make a living from the bamboo mountains, life will grow better like this piece of bamboo, one bit at a time."

The Bamboo Path to Prosperity

Mr. Lin Zhaoying, a villager from Houlou Village, Yangzhong Town, Youxi County, Fujian Province



Lin Zhaoying is a villager from Houlou Village, Yangzhong Town, Youxi County, Fujian Province, which is famed as China's Homeland of Bamboo. In his words, "We farmers in mountainous areas depend on the mountains for our sustenance, so our way to prosperity must be sought in the mountains. The scientific and creative way that I've found to wealth was to plant dendrobium in my bamboo forest." He personally has found a way of using his bamboo forests to create "gold."

Meeting Challenges to the Bamboo Industry

A few years ago, Youxi County launched a raft of preferential policies to support the development of the bamboo industry. Convinced of the rosy prospects for forest industry, Lin found a good opportunity to shape his career.

"Setting up in business here was a better way of escaping poverty than leaving the area to be a hired worker elsewhere," Lin said. In 2005, he rented over 300 *mu* (20 hectares) of bamboo-clad mountainside in his village, signing a 30-year contract with the village committee, devoting himself to growing and developing the bamboo industry.

The forest leased to him had low bamboo yields due to extensive management, and the bamboo stems were of small diameter. In order to make changes, Lin called in forestry experts to make scientific plans and give him technical guidance. After 12 years of training and exploration in bamboo growing, he mastered the technology of high-yield cultivation, water-saving irrigation and fertilization formulae, and is now famous in Youxi County as an indigenous expert in bamboo cultivation.

He started with infrastructure improvement and scientific management, and put much more investment into his bamboo forest. Over the past 12 years, he has put RMB1.2 million into the construction of a 6.3 km-long road and a sprinkler irrigation system in his mountainside bamboo forest. He built four water tanks and

installed a four-km-long water diversion pipe to take running water to his bamboos. In the improved operating conditions, his forest management has improved significantly, as have the all-round benefits.

Today, there are 200 bamboos per *mu* in his 300 *mu* (20 hectares) of bamboo forest, and the bamboo diameter has increased markedly. His economic benefits have soared from RMB60 to RMB1,500 per *mu*.

A Model Expert in Scientific Bamboo Cultivation

The Indigenous Expert has built a Bamboo Forest Cultivation Science and Technology Demonstration Garden. His great success has set a good example for bamboo farmers in Youxi County. He often invites growers to visit his garden, teaches them his planting and cultivation techniques and supplies them with bamboo seedlings so that they may set out on their way to wealth.

In 2013, he took a contract on some mountainside areas and invested in creating Youxi's first Bamboo Ecological Science and Technology Park. It was a two-phased endeavor: the first phase involved growing 500 *mu* (33.3 hectares) of varieties of bamboo at a total investment of RMB8.5 million; the second involved cultivating a 500-*mu* area to grow fruits, medicinal herbs, and flowers.

In early January 2013, Lin got started on establishing his Ecological Garden of Bamboos, cultivating 180,000 bamboos of 120 species including ornamental bamboos such as *Phyllostachys nigra*, *Phyllostachys prominens*, sweet princess bamboo, fern leaf hedge bamboo, and *Bambusa multiplex*, and cash crop bamboos such as *Phyllostachys praecox*, *Acidosasa edulis*, *Pleioblastus amarus* and *Bambusa oldhamii*. In addition, he established his Ecological Science Research and Experimental Base and Ecological Science and Technology Demonstration Base. But that is not the whole story: Lin has built the garden into farmhouse paradise with high-tech kit, a paradise embodying ecological achievements. It is now a new bamboo scenic spot amidst a gorgeous landscape, a leisure, tourism and holiday destination.

Inter-Planting Leads to Wealth

Lin has kept his ideas fresh and, over the past few years, has shifted his attention to growing other plants among his bamboos, treading another path to wealth. He has grown dendrobium, a traditional Chinese medicinal plant that is used either raw or processed as a healthcare product. This feeds on the roots of bamboo, speeding up their decay. The natural decaying process usually takes about 12 years but by growing dendrobiums, this can be reduced to four years. Furthermore, cultivating dendrobium is profitable.

In order to expand the dendrobium growing area, Lin has invented four planting patterns: planting it among bamboo roots, inside suspended bamboo tubes and Cola cans, and on trees, where it grows healthily. He has spent over RMB100,000 on

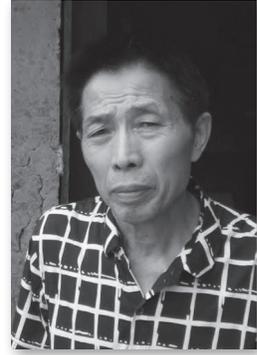
sprinkler irrigation equipment, which benefits both his dendrobium and his bamboo. Yields of the latter have risen as a result.

Not content with “killing two birds with one stone,” Lin has found even more ways to wealth. He exploits bamboo roots and tubes creatively and the dendrobium grown in them sell at high prices and have bright prospects. He also grows edible fungus and dictyophora in his bamboo forest, opening up a new green world which augments his income and creates a good example for others to follow.

He has never had to leave his stretch of mountains and bamboos. Indigenous Expert Lin takes a scientific approach to cultivating his bamboo forest and, by setting up the Forest Cultivation Science and Technology Demonstration Park in Youxi County, he has won fame as a county-level model bamboo grower, one who has turned his green bamboos into a forest of gold.

Bamboo: a Source of Family Prosperity

Mr. Huang Engui, a villager of Tianqiao Village, Datong Township, Chishui, Guizhou Province



The family of Huang Engui, a villager of Tianqiao Village, Datong Township, Chishui, Guizhou Province, live a more affluent life these days — all thanks to going in for bamboo production.

Huang has over 100 *mu* (6.7 hectares) of bamboo forest, from which he takes 150-plus tons of bamboo timber a year, earning as much as RMB60,000.

Prosperity by Afforestation of Cultivated Land

Tianqiao Village is located in a typical mountainous region, with forest covering 77.2 percent of the land area. There are more than 16,000 *mu* (1,100 hectares) of bamboo forest, of which 500 *mu* (34 hectares) are Moso bamboo forest. The average forested area is nearly seven *mu* per head of Tianqiao's population.

These natural resources went wasted in the past and Huang used to make a meagre living, just getting by growing crops and raising pigs. Tianqiao Village is blessed with a warm and humid climate and fertile land suitable for bamboo growth. Nevertheless, weeds and bushes ran rampant on his 60-odd *mu* (4 hectares) of land, and it was a subsistence existence, without any cash crops grown for income. However, after the agricultural reforms such as the household contract responsibility system introduced in the 1980s, households began to have surplus labor available to work for others, and their wages became an important source of family income.

In 2001, Chishui was listed as a provincial pilot county for returning cultivated land to forest. Datong Township government organized all its staff to spread the message about the new policy. The Tianqiao Village Party branch and the village committee held discussions involving all Party members and other villagers about the policies and called on them to “return farmland to bamboo forest and develop bamboo industry,” so that all villagers could live a life of plenty. Huang now owns more than 100 *mu* (6.7 hectares) of bamboo forest. The output of bamboo timber can

be as much as 150 tons a year.

Bamboo Mats Weave a Wealthy Life

Over the course of six years, Huang expanded his bamboo forest, and his mountainous lot was covered with groves of thriving bamboo. Nowadays, bamboo timber fetches RMB440 per ton and Huang earns annually over RMB60,000.

Even so, Huang was still not satisfied. He figured a way to make his forests much more profitable: if he established a workshop to process his own timber, for example, to weave bamboo mats, he could earn three times as much as from timber alone. Each ton of timber could make 250 sheets, and at RMB4 to 4.4 per sheet, he could earn at least RMB950 per ton. Furthermore, processing bamboo into mats is not restricted by time, place or climate. It requires only modest investment, simple techniques and non-intensive labor; production can involve men or women, old and young. After weighing up the pros and cons, and doing the math, Huang bought two bamboo slicing machines and took the initiative to produce bamboo mats in his own house. After a while, his experiment won the approval of some bamboo plywood factories and the whole village was quick to copy him.

Within a few years, mat-weaving developed swiftly in the village and Tianqiao's fame as the "mat village" spread far and wide. Now there are 585 bamboo slicing machines, roughly one per household. Villagers, regardless of gender and age, make mats all year around. A strong male can weave over 30 mats daily if he is not engaged otherwise, and a housewife can make over 10 on top of her household chores such as raising pigs and chickens.

The raw material and transportation cost per mat is about RMB1.7 and processing expenses come to RMB2.3. Each year the villagers can process a million bamboo mats, producing a turnover of RMB4 million. Mat making can bring each household nearly RMB5,000 a year, and, in some cases, as much as RMB15,000.

Huang's Blueprint for the Future

The villagers of Tianqiao are all better-off now, Huang included. But he is not satisfied yet. He says there is still a long way to go before they can measure up to the Central Government's requirements of a new socialist countryside. Here is his plan.

To start with, he aims to quadruple his income from bamboo business. In the coming four or five years, he will improve the yield per unit area by growing bamboo in the same way that he grows vegetables, i.e. by means of weeding, scarification, fertilization and disease prevention. He will strive to raise his output of timber from the current 1.5 ton per *mu* per year to 2.5 ton by 2020, and bring his annual sales revenue to around RMB100,000.

Then, tertiary industry awaits. Based on local scenic attractions like Sidong Creek and Ancient Datong Town, he will develop tourism services by providing farmhouse

entertainment. This will attract city-dwellers to come and breathe fresh air into their lungs, go sightseeing and relax. They go home refreshed.

Now Huang's family live a life of plenty. Following his example, there are fewer villagers leaving to seek work away from home; instead, they stay on to earn money in the village. Bamboo and its products have woven a prosperous life for Huang and his fellow villagers.

Bamboo Administrators

Reflecting the six-level structure of government in China, there are six levels of government involved in guiding the bamboo industry: the central government and five other practical levels of local government: province (municipality), city (region), county (district), sub-district (township), and neighborhood committee (village). What we introduce in this book are decision-makers at all levels of government, directors of industrial associations, directors of scientific research institutions, and village leaders. Although they work at different posts, unlike other bamboo industry participants, their work chiefly involves dealing with people. The main duty of their work is to formulate, improve and implement relevant policies, laws and regulations, creating a better and competitive market environment in order to fully arouse enthusiasm among all the people and to ensure the efficient operation of the bamboo industry.

The central government administrators mainly plan and design macro bamboo industry-related policies for provincial and autonomous regions. Many years ago, Chen Jiawen, head of the Planning Department of the State Forestry Administration was in charge of the research, preparation and implementation of the National Bamboo Industry Development Plan (2013-2020). Dr. Li Nuyun, former secretary-general of the China Green Carbon Foundation (CGCF) and deputy director of the Climate Change Office of the State Forestry Administration, is committed to pushing the development of bamboo forest carbon sinks and improving China's forest carbon sink operations.

Two provincial administrators are introduced in the book. Lan Xiaoguang is chief engineer in the Zhejiang Forestry Administration, China's most important bamboo province, and is mainly engaged in the management of Zhejiang's bamboo industry. He clarified the threads of Chinese bamboo culture and outlined its theoretical system. Zhejiang Agricultural and Forestry University is located in the Chinese

bamboo growing area and has a strong research program in the field of bamboo. The principal, Professor Zhou Guomo, who is responsible for management of thousands of students and faculty, is a senior expert on bamboo forest carbon sinks. Expert leadership over the bamboo industry is a common feature at the provincial (district) level.

Included are stories of the frontline administrators: Shao Xiaoping, Wang Anguo, Liu Wengui, Li Lusong, Xia Genqing and others. The book describes how, in Zhejiang Province, Shao Xiaoping, the Party secretary of Fude Village, Chun'an County, not only started his career in a bamboo product processing plant, but also led the villagers in pursuing a forestry economy. In Lin'an City, Zhejiang Province, Forestry Bureau Chief Engineer Wang Anguo founded the Lin'an City Modern Forestry Science and Technology Service Center, which has provided down-to-earth technical services for bamboo farmers for 30 years. In Fujian Province, Liu Wengui, secretary-general of the Bamboo Incense Stick Chapter of the Yong'an City Bamboo Industry Association, is a master of his field and a good administrator as well. Li Lusong, director of the Yong'an Forestry and the Bamboo Industry Development Bureau, Fujian Province, Xia Genqing, chief engineer of the Forestry Bureau of Jiande City and chief bamboo promoter of Jiande City, Zhejiang Province, all dedicate themselves to the development of the local bamboo industry.

The rapid development of China's bamboo industry has clearly benefited from good policies and management, even though it is facing challenges, such as incomplete policies, high taxes, unbalanced market, and unclear development policies. How to further deepen the management system and structural reform of the Chinese bamboo industry is a shared concern of these administrators.

The Top Bamboo Garden in North China

Mr. Cao Zhenqi, head of the Zizhuyuan Park in Beijing



Built in 1953, the Zizhuyuan Park (Purple Bamboo Park) is located to the west of Baishiqiao on Xizhimenwai Road in Haidian District, Beijing. The park got its name from a centuries-old temple called Fuyin Zizhuyuan (Blessed Purple Bamboo Temple) to its northwest. Its total area of 47.35 hectares contains three lakes, two islands and one dyke, and it is traversed by the Nanchang River and Shuangzi Channel. Dedicated to the spreading of bamboo culture, the park is a scenic landscape garden themed on and dominated by bamboo. It boasts the greatest number of bamboos in the capital and is known as the Top Bamboo Garden in North China.

Building a Bamboo Species Resource Pool in North China

Since bamboo grows primarily in southern China, the presence of such a bamboo-themed park in Beijing could surprise some people.

According to Cao Zhenqi, the park originally had 35 bamboo species, but these days there are over 120 species to be seen. Over the past years, the park has kept on enriching its variety by introducing new bamboo species from the south.

A visit made to Sichuan in search of purple bamboo in 1972 is still fresh in the memory of senior engineer Fan Zhuomin. “It involved climbing all day and working our way over many mountains. In these mountains, the vegetation was dense, and after centuries of evolution, there was little purple bamboo in evidence. So, when we found deep purple bamboo, everyone became very excited and forgot their exhaustion.” In the winter of 1991, in order to enrich the diversity of purple bamboo, the park authorities sent people to Gansu Province, the native home of purple bamboo, to bring back over 2,000 bamboos. Subsequently, technicians were sent to Jinhua in Zhejiang and Queshan in Henan to introduce purple bamboo on a large scale. At present, there are some 10,000 bamboos, distributed mainly in the Fuyin

Zizhuyuan and bamboo exhibition area, which have become must-visits for visitors.

But can southern bamboo thrive in the north, with different climate, soil and water? Actually, purple bamboo from the south is never moved directly into the park: first it has to be “domesticated” for about two years at the bamboo base before it can be planted in the park.

To give the bamboos the best possible start in life, the park erects windbreaks and covers the roots with leaves and soil in winter. In 2011, the park built a bamboo exhibition area of 3,300 sq m to showcase more than 30 bamboo species with high ornamental value. In order to offer close views of every species, the park designed special visitor trails winding through the exhibits. The walkways are decked with bamboo boards.

The park’s emphasis on nurturing species has made it an important bamboo species resource pool in northern China. Every year, senior engineer Fan Zhuomin conducts research relating to the planting and protection of northern bamboo; Fan’s publication of *Technical Regulations for Bamboo Cultivation and Protection* has had a great influence on bamboo cultivation in North China. According to Cao Zhenqi, Miyun District and Changping District of Beijing, and even Tianjin and Hebei Province have introduced bamboo species from the Zizhuyuan Park, the total number exceeding 10,000 bamboo trees.

In 2009, along with the International Network for Bamboo and Rattan (INBAR), the park created an energy-saving and environment-friendly bamboo building inside the park. It is a two-story building made mainly of bamboo, an INBAR demonstration project in China, the first of its kind. It serves as a teahouse for visitors, helping them learn more about applications of bamboo materials in life. Moreover, it is all of a piece with the surrounding bamboo landscape.

A Window to Promote Bamboo Culture

In the eyes of Cao Zhenqi, to justify its claim to be the Top Bamboo Garden in Northern China, the Purple Bamboo Park should feature a sizable bamboo planted area and also promote bamboo culture. Cao has devoted much effort to this end. Through continuous exploration, the park has built the bamboo-themed Yunshi Garden, and has organized exhibitions and cultural festivals that go deeply into the subject. It has also created ten brands: “Understanding Bamboo,” “Loving Bamboo,” “Tasting Bamboo,” “Enjoying Bamboo,” “Writing about Bamboo,” “Drawing Bamboo,” “Listening to Bamboo,” “Praising Bamboo,” “Eating Bamboo” and “Using Bamboo.”

Cao describes the park’s greater mission as the spreading and promotion of bamboo culture in northern China. Every year, it invites the Beijing Bamboo Orchestra to perform on various bamboo instruments, an event called “Listening to Bamboo”; “Using Bamboo” is embodied in the house built entirely of bamboo and a

shop selling bamboo fiber products in the park that demonstrates the usable value of bamboo.

Purple Bamboo Park was the first Beijing park to open free of charge to the public. It received 10 million visitors in 2014, opening the doors to the “green world of bamboo.” But its main focus is as it has always been: how to bring bamboo into the homes of ordinary people. Cao mentions a new trial being conducted in the park — cultivating potted bamboo. At present, there are over 3,000 pots of bamboo, belonging to various species. At the 15th anniversary celebration of INBAR’s founding, the potted bamboos came from the Purple Bamboo Park.

The freshness and elegance of the Purple Bamboo Park makes you forget the hustle and bustle of the city; it is like wandering through China’s homeland of bamboo in the south.

A Pioneer of Bamboo Forest Carbon Sinks

Dr. Li Nuyun, secretary-general of the China Green Carbon Foundation



Dr. Li Nuyun, secretary-general of the China Green Carbon Foundation (CGCF) and deputy director of the Climate Change Office of the State Forestry Administration, is a bamboo forest carbon sink pioneer. Search her name on-line and you will find multitudes of her videos, monographs, papers, presentations and reports on forestry carbon sinks.

Li has been committed to studying and promoting forestry carbon sinks for over 10 years, firmly convinced that “Despite its relatively small quantity, the comprehensive benefits of forestry carbon reductions outweigh industrial carbon reductions.” Therefore, she goes out of her way to encourage enterprises to exploit carbon sinks to offset carbon emissions.

Li explains that forest plants including bamboo photosynthesize carbon dioxide and water into carbohydrates and release oxygen. They also provide the basic necessities of life. This is how a forest bamboo carbon sink functions. As a species in the forest ecosystem, bamboo is well-known for its fast growth and efficient use of solar energy, and Li is fascinated by its ability to uptake and fix carbon quickly and efficiently.

However, not every forest or bamboo forest carbon sink can be traded on the market. So what kind of carbon sinks can be traded?

Li explains that, in accordance with Chinese and international rules on carbon trading, tradable carbon sinks are those generated by carrying out projects according to an approved methodology and relevant rules. Carbon sinks are additions, but not all additions are tradable. Only carbon sink additions that have something “extra” can be traded.

For instance, existing trees take up carbon dioxide every day that they grow. Although they are carbon sink increments, they have nothing “extra” and therefore, are not tradable; nor can existing forest carbon reserves be traded since they are reserves, not increments.

Tradable carbon sink additions are those produced by carrying out afforestation and forest management projects compliant with an approved methodology. Therefore, carbon sink additions must be verified in compliance with the right methodology.

For this reason, Dr. Li has always believed that the first priority is to develop a scientific model and methodology for bamboo forest carbon sink afforestation.

As early as 2007, when Li was deputy director of the Afforestation Division of the State Forestry Administration responsible for forestry in response to climate change and biomass energy, she assigned carbon sink afforestation pilot projects. She initiated bamboo afforestation projects and organized research on the methodology of conducting bamboo carbon sink afforestation projects.

The projects took place in China's Homeland of Bamboo — Lin'an, in Zhejiang Province. Zhejiang Agriculture and Forestry University, China's most prestigious institution for bamboo education and research, led the study on a bamboo carbon sink afforestation model and carbon sink measuring and monitoring methods.

Bamboo carbon sink afforestation, and carbon sink measuring and monitoring proved quite tricky in practice. Accordingly, Li held many discussions involving experts and scholars from various fields such as forestry carbon sinks, bamboo research and carbon inventory. The results were the compilation of *Methodology of Measuring and Monitoring Bamboo Carbon Sink Afforestation and the implementation of the first bamboo carbon sink afforestation project in China*.

On November 1, 2011, 8,155 tons of carbon emission reductions anticipated from a bamboo forest carbon sink pilot project involving 800 *mu* (26.7 hectares) was sold at the launching ceremony of the Forestry Carbon Sink Trading Pilot at East China Forestry Exchange. The smooth implementation of this project was a successful exploration of carbon sink measuring in bamboo afforestation projects and how to trade bamboo forest carbon sinks, taking the lead in fixing the value of bamboo forest ecological services in China and the world. This was described by Zhao Shucong, director of the State Forestry Administration, as "China's first standardized trade of forestry carbon sinks."

On October 14, 2014, Li Nuyun chaired the launch of the Carbon Sink Trading System of Rural Households in Lin'an. At the event, of the 42 farmers receiving their carbon sink certificates, some made a living from growing and selling bamboo. The farmers had never in their wildest dreams imagined anything like this. At Li's pushing, intangible ecological services had become tradable and the farmers were surprised and delighted to trade carbon emission reductions at the price of RMB30 per ton. "The carbon trading certificate enables me to benefit financially from carbon sinks in addition to bamboo timbers and forest sideline products," exclaimed Zhang Jianrong, a representative of the farmers.

China is the world's center of bamboo. Li holds that China's strengths in the

bamboo industry lie not only in bamboo growing and processing but also in bamboo carbon sink projects. Above all, China is the first in the world to develop the methodology of exploiting bamboo, and to implement and trade bamboo forest carbon sink projects. Therefore, she energetically pushes China's bamboo carbon sink projects beyond China. She presided over the implementation of the world's first clean development mechanism (CDM) forestry carbon sink project and is fully confident that China's bamboo forest carbon sink projects will enter the international market.

The year 2011 witnessed the beginning of long-term cooperation between the CGF and other organizations such as INBAR and Zhejiang Agriculture and Forestry University in a joint effort for sustainable management and exploitation of bamboo forests to cope with climate change. There has been a warm response and praise for the foundation's achievements in the methodology of bamboo afforestation carbon sink projects and the pilot training involved.

Li is determined to keep on pushing the development of bamboo forest carbon sinks even further.

Planning from the Top to Encourage Pursuit of the Bamboo Dream



Mr. Chen Jiawen, director of the Department of Development Planning and Assets Management of the State Forestry Administration

China, as a giant bamboo country, has development experience that is worth sharing and exchanging; planning from the top level and guidance at macro level are the most crucial.

Attending a bamboo industry policy exchange conference in China, the Bangladesh ambassador in China Muhammad Azizul Haque once said that, in addition to Chinese technological and market experience, it was the development policies for the Chinese bamboo industry that the Bangladesh government was most interested in borrowing and learning from.

Planning Is Essential for a Robust Industry

On matters of policy, the most important development of recent years has been the introduction of the National Bamboo Industry Development Plan (2013-2020).

It is China's first ever development plan for the bamboo industry. Since its unveiling in 2013, it has been interpreted and analyzed continuously. It is the programmatic document for the future of China's bamboo industry.

In fact, the bamboo industry was never absent from the key points of China's forestry policy and the industrial revitalization plan. So why bring out a plan specific to the bamboo industry development? According to Chen Jiawen, bamboo is one of ten Chinese forestry industries highlighted for development that have potential for enriching the people, being not only eco-friendly, but also conducive to recycling and carbon sequestration. Chen Jiawen says China's bamboo forest covers an area of 6.73 million hectares and there are more than 500 species of bamboo in 39 genera, which are distributed over 27 provinces. For a country like China with countless mountains, it is of great significance to develop the bamboo industry in the perspectives of both ecology and people's livelihood.

This plan, with a span of eight years, has put forward the overall development

goals to be reached before 2020. That is, by 2020, the gross value of the bamboo industry will reach RMB300 billion, the number of people directly employed in the industry will reach 10 million, and the average income from the bamboo industry for each farmer will amount to RMB2,100 per year, representing over 20 percent of farmers' per capita net income.

Alongside the national development plan, there are local support plans in many bamboo producing areas. They outline the robust development of the industry.

Bamboo Becoming an Irresistible Force with Increasing Support

Though China has the honor of having the world's largest bamboo industry, it must be admitted that many things stand in the way of its development. Chen Jiawen's analysis points to a raft of problems: unbalanced regional development, uncoordinated industry development, the small scale of enterprises, and the low added value of products, to name but a few.

On the matter of bamboo industry policies, what concerns Chu Xuesong, leader of a bamboo cooperative in Anji, Zhejiang Province, is what support policies there will be. Chen Jiawen uses three key words — subsidies, financing and insurance — to sum up the “policy package.” As regards “subsidies,” a system of general preferential policies will be gradually established for the bamboo industry. The pilot scope of central financial subsidy for bamboo afforestation and tending will be expanded step by step. And systems of subsidies for growing superior seeds and for bamboo machines and tools will be set up. As regards “financing,” supporting mechanisms such as microloans for bamboo farmers and loans for medium-sized and small enterprises will be established. Effort is to be made to get the bamboo industry included in central financial support for the development of modern agriculture. At the same time, polices are to be made and measures improved to encourage more social capital, non-governmental investment and foreign commercial capital, in order to attract a greater diversity of social funds and foreign investment to promote the production and development of bamboo products. As regards “insurance,” the aim is to establish and improve a bamboo forest insurance mechanism supported by government finance, and further expand the financial support from the central government for bamboo forest insurance.

Kang Xiaohua, a manufacturer of bamboo furniture in Jiangxi Province, is more interested in how to expand the market. Chen Jiawen said that, in order to strengthen guidance on consumption policies relating to bamboo products, the State Forestry Administration is making every effort to get bamboo products included among the national procurement catalog of green building materials, to bring bamboo office furniture into the scope of government procurement, and to establish and improve the diversified, stable and safe market system for bamboo products.

No Confidence Without a Platform

It is Chen's opinion that the role played by supervisory government departments in the development of the bamboo industry should be a dual one — both serving and leading. Also, that these roles must be played on different platforms, namely the policy platform, the science and technology platform, the culture platform, and the trading platform. This exemplifies “the government builds the platform and the industry does the acting.”

As regards the sci-tech platform, the Chinese Academy of Forestry has established the Technology Innovation Alliance of Wood/Bamboo Industry, and the State Forestry Administration established the China National Bamboo Research Center. They are cooperating with other bamboo research institutions to continue in depth the scientific and technological innovations of the bamboo industry. As regards the trading platform, thanks to the efforts of the International Network for Bamboo and Rattan (INBAR), 24 kinds of bamboo and rattan commodities have received their unique customs codes and names used in international trade, which cover at least 80 percent of China's bamboo and rattan commodities. The influence and acceptance of bamboo and rattan products will be gradually expanded.

Chen Jiawen believes that, with the development of China's bamboo industry, related policies are showing continuous improvement. China's bamboo industry, benefiting from the healthy interaction between the top level and the grass roots, will have more pleasant surprises in pursuit of the “bamboo dream.”

Cooperative Shoots Its Way to Prosperity

Mr. Jiang Yingjun, chairman of Shuanglian Bamboo Shoots Cooperative, Yong'an, Fujian Province



Winter and spring are busy seasons for farmers in Yong'an, Fujian. They dig out and cut, pull up and bake bamboo shoots...these little things are so important to the bamboo growers, they see them as a never-ending source of prosperity.

“We producers soak the dried bamboo shoots in water, then cut them up and package them as Yulan (Sliced Bamboo Shoots). These tender slices are really popular in the market and they sell in Xiamen, Shanghai and Putian,” said Jiang Yingjun, chairman of Shuanglian Bamboo Shoots Cooperative. “In 2015, sales of Yulan reached RMB1.5 million and one kilo of the branded product sold for RMB10 more than the originals. So the villagers in the cooperative are really positive about the prospects for the product.” Cooperative head Jiang could hardly contain his delight.

Passing On the Tricks of the Trade

Jiang Yingjun is a native of Shuangfeng Village, Gongchuan Township, Yong'an, Fujian Province. His family has been engaged in the business of dried bamboo shoots and Moso bamboo for generations. It is said that as early as over 1,000 years ago, Li Qihong, the 18th descendant of King Jiang of Minyue (present-day Fujian), took his family to settle in Shuangfeng Village. They made a living by cultivating bamboo seedlings, pioneering the business of cultivating bamboo and bamboo shoots in Yong'an.

During the Qing Dynasty, there were bumper harvests of bamboo and bamboo shoots, the latter being boiled and dried in the sun prior to sale. The major players in bamboo shoot commerce established the Gongchuan Bamboo Shoot Chamber of Commerce. Thereafter, business in dried bamboo shoots prospered and the products were exported to Japan, Malaysia and other overseas markets. Their popularity abroad has never dimmed.

Inheriting the unique baking craft of his forefathers, Jiang became a master of making dried bamboo shoots. He is very particular about the process. It has nine

stages, going from peeling, via trimming, boiling, cooling, selecting, squashing, squeezing, and rinsing to baking.

Jiang's dried bamboo shoots are high quality, fresh tasting, plump and golden; they have conspicuous buds and a long shelf life. Because their fame is so widespread, bamboo shoot dealers from all over China swarm to purchase them: they need no active sales effort. Purchasers have been beating a path to his door for many years now.

Business Innovations

In November 2011, Jiang took some dried bamboo shoot samples to Zhejiang markets, but negotiations with dealers there did not result in orders. Nevertheless, far more important than coming back with orders was the impression he got that dealers feared being cheated and were keen to cooperate with enterprises or agricultural cooperatives in order to reduce their business risk. Back home, Jiang got the idea of setting up a bamboo shoot cooperative with his fellow villagers. They went for the idea. They dispersed to invite more villagers to join the cooperative so that they might break into the market as a collective.

On March 21, 2014, after much lobbying and persuading, 31 villagers from Shuangfeng Village of Gongchuan Township and Lianhe Village of Shangping Township set up the Yong'an Shuanglian Bamboo Shoots Cooperative, with Jiang as its chairman. Initially, many villagers hesitated to join and decided to wait and see.

On March 25, 2014, after field investigations, the cooperative began to cooperate with Xiaozhuang Bamboo Shoots Cooperative based in Longquan, Zhejiang Province. The Xiaozhuang cooperative purchased all their dried bamboo shoots two months later. The total quantity was 25,000 *jin* (12,500 kg), and the price was 1 percent higher than that at local markets. This immediately became the talk of the village. Many more people wanted in, and the cooperative's membership soared to 110.

Soon afterwards, Shuanglian chose to cooperate with Xiaozhuang's food factory in the deep-processing of bamboo shoots. This cooperation involves producing bagged sliced tender bamboo shoots. They undergo high-temperature sterilization without use of preservatives; the troublesome soaking procedure is avoided and the end product is tasty and convenient. They soon found their way into restaurants and hotels. The novel combination of dried bamboo shoots and sliced tender bamboo shoots fattened the purses of the villagers.

Growing Medicinal Herbs Among the Bamboos

With the sweet taste of success in his mouth, from his innovations in the bamboo shoot business, Jiang shifted his attention to bamboo forests, seeking a new source of wealth there.

In November 2014, at Jiang's suggestion, the cooperative began to purchase from herb growers wild seedlings of *Paris polyphylla*, *Polygonatum cyrtonema* (giant

Solomon's Seal) and *Huanghua arillata* (yellow-flower milkwort), and interplanted them among the bamboos.

In June 2015, with efforts from all, Jiang's cooperative and the Sanming School of Forestry reached a cooperation agreement. Forestry experts from the school made investigations to select over 190 *mu* (12.7 hectares) of bamboo forest in six separate lots across different altitudes, from 200 m to over 1,000 m. Experiments were conducted to interplant *Dendrobium candidum*, *Anoectochilus roxburghii*, *Paris polyphylla* and *Polygonatum cyrtonema*.

The experts decided that the seedlings should be grown on either side of ditches in the bamboo forests and instructed Jiang in great detail on the interplanting techniques.

With the experts' help, some of the herbs planted in 2014 came back to life and began to thrive. In 2016, *Anoectochilus roxburghii*, *Polygonatum cyrtonema* and *Huanghua polygala* were sold across China, increasing the incomes of the co-op's members significantly. Good herbs were sold at high prices and the price of dried *Anoectochilus roxburghii* reached as much as RMB600 per 50 g.

Very soon, Jiang led the members to dry their *Polygonatum cyrtonema*. Once launched, they were immediately popular and attracted many buyers after being shown at the 12th Cross-Straits Forestry Expo.

Currently, Jiang is thinking about new products and new opportunities for his cooperative.

Sci-Tech Promoter in the Land of Bamboo

Mr. Xia Genqing, chief engineer of the Forestry Bureau of Jiande City, Zhejiang Province, chief bamboo promoter of Jiande City



Jiande is a county-level city in a mountainous area of western Zhejiang. Today it boasts 200,000 *mu* (13,333.3 hectares) of bamboo forest, which not only provides forest workers a green eco-environment to live in, but is also an important source of additional income. The founder of this bamboo forest — Xia Genqing, chief engineer of the Forestry Bureau of Jiande City, Zhejiang Province, and chief bamboo promoter of Jiande City — then a fresh-faced scholar, is now an old man, his hair gray at the temples.

Back in the 1980s, Xia Genqing was a young forestry major, fair-skinned and bespectacled. He came to Jiande as a university graduate with the most basic of luggage, and has been tied to the mountains and rivers of Jiande ever since for more than 30 years. He has worked in this mountainous region of Zhejiang, sedulously cultivating bamboo and popularizing bamboo cultivation technology.

Cultivator of Bamboo Forest

In his capacity of chief bamboo promoter in Jiande, Xia Genqing has always been concerned about the fate of Jiande's 200,000 *mu* of bamboo forest, sedulously studying all technologies as applied to bamboo production, the growth of bamboo shoots, and to business. Besides, he energetically organized and implemented the following projects: popularizing standardization technology for Moso bamboo; the provincial demonstration district of leading modern forestry industries; the garden of elite products; the urban agriculture demonstration park of Hangzhou City; the Hangzhou City complete set of agricultural infrastructure; and the Hangzhou City “vegetable basket” demonstration park project.

He demonstrated and popularized to forest workers such techniques as standardized cultivation management of Moso bamboo, balanced fertilization, and bamboo forest structure adjustment. As a result, the demonstration area expanded

to 11,500 *mu* (766.6 hectares), the number of those trained topped 500, and output value per *mu* (0.06 hectares) in the demonstration area rose from RMB400 in the pre-implementation period to more than RMB1,000 afterwards. This motivated more than 6,000 households outside the demonstration area, connecting a bamboo base covering 50,000 *mu* (3333.3 hectares).

The transformation of the low-yielding plantation under extensive management produced an income increase of nearly RMB300 per *mu*, and the cultivation of bamboo forests for both the shoot and the bamboo pole resulted in an increase of around RMB500 per *mu*. In 2008, Xia Genqing was named the outstanding model worker of Jiande City for agricultural technology popularization.

Guardian of Bamboo Forest

In mid-January, 2008, Jiande was hit by snow and ice storms; the Moso bamboo forest was the worst hit. An area of more than 50,000 *mu* (3,333.3 hectares) was severely affected, with great tracts of toppled, broken or split bamboos, with more than 220,000 poles badly damaged. After the disaster, a Jiande bamboo industry team led by Xia Genqing went out to individual households, braving the deep snow to reach the frontline, to help bamboo farmers back on their feet through engaging in production.

The team went to the most severely impacted towns and villages, conducting five technical training sessions in post-disaster restoration and the technique for using both bamboo and shoots. The number of trainees amounted to 320. In order to tackle the sales problem of broken and split bamboo, Xia asked far and wide about how to process and sell the damaged bamboo, and sought markets for snow-crushed raw material, with a view to minimizing the bamboo farmers' loss. He was named an advanced individual by Hangzhou Party Committee and Hangzhou People's Government in recognition of his work helping people through this natural disaster.

A Researcher in Bamboo Forestry

After thorough investigations, Xia Genqing formulated a plan for Jiande bamboo industry development (2011-2020), organized the authentication of the Moso bamboo organic food base, forest food base and pollution-free forest food base, actively carried forward the development of forest product quality and safety, and assisted enterprises in winning recognition for 19,000 *mu* of organic bamboo shoot base, 35,000 *mu* of Moso bamboo forest food base, and 15,400 *mu* of pollution-free Moso bamboo base.

In the main bamboo producing areas, he took more than 60 soil samples, tested and analyzed the nutrient levels of available nitrogen, phosphorus, potassium, and organic matter in the soil, implemented Moso bamboo formula fertilization based on

his testing, and established formula fertilization demonstration sites of more than 500 *mu* (33.33 hectares). In his years of non-stop practice, Xia Genqing's achievements in popularizing science and expanding research have been many and various; he has published more than 20 popular science articles and seven papers, among them "On Jiande Bamboo Industry Development Measures" and "The Physical and Chemical Properties of Different Artificial Bamboo Forest Soils." He compiled three textbooks of practical rural technology, among them *Edible Bamboo Cultivation Technology* and *Efficient Cultivation Technology of Moso Bamboo*.

With the passage of years, Xia Genqing's temples have gradually turned gray, while the bamboo groves in Jiande have become greener and greener. It is a picture that fills bamboo farmers in the mountain areas with hope.

A Civil Servant Dedicated to Yong'an's Bamboo Industry

Mr. Li Lusong, director of the Yong'an Forestry and Bamboo Industry Development Bureau, Fujian Province



Yong'an in Fujian Province is known as China's "land of bamboo and bamboo shoots." Its forest coverage rate reaches 81.96 percent and there is over 1 million *mu* (67,333 hectares) of bamboo forest. In per capita terms, farmers average 6.7 *mu* (0.44 hectare) of bamboo forest, ranking first nationally.

Li Lusong's career has been closely associated with bamboo for over 20 years. In 1994, he started work as an ordinary cadre in Xiyang Forestry Station in Yong'an and later transferred to Yong'an Forestry Bureau, serving first as deputy director of the bureau and later as director of the Forestry and Bamboo Industry Development Bureau.

Over the past 20 years, wherever his place of work and whatever his position, the bamboo industry has always been a key area of focus for Li, and he always does his utmost to promote the development of bamboo industry in Yong'an.

Pulling the Bamboo Industry "Engine"

Yong'an bamboo products used to be lacking in variety, but over recent years, Yong'an's bamboo industry has been developing fast, and its products have increased in popularity. Much of the credit for this must go to Li, who has done much to promote its development in terms of attracting investment, constructing industrial parks, landing projects, building brands, making innovation research, offering financial services, and other aspects.

It is Li's habit to offer bamboo businesses in Yong'an good advice on their development and to help with their problems. A good case in point is that of Fujian Jiafeng Bamboo Furniture Co., Ltd.

This company used to produce bamboo chopping boards, bamboo mats and other bamboo products. They were relatively low-end products with small added value, and a small market share. Thanks to Li's support, the company is now a

leading manufacturer of bamboo furniture. Over the past few years, he has offered the company numerous good ideas on its transformation and upgrading. He helped it to acquire 43 *mu* (2.8 hectares) of land in Yong'an Nige Development Zone at a preferential price and to bag a forestry loan of nearly RMB20 million. He also acted as an intermediary between the business and Yong'an Bamboo Industry Research Institute, which provides the company with technological services including product development and design.

Developing the Yong'an Bamboo Fair

The first Yong'an Bamboo Shoot and Bamboo Festival was held in 2002. It has been held every year since, growing in stature. It is now known as the October 18th Yong'an International Bamboo Fair.

After 2002, Li worked very hard for over 10 years on organizing and preparing for the festival. Every year he would spend quite a few months on preparations, so as to make that year's event even better than the last.

Attracting investment is the very most important part of the preparations for the Bamboo Fair. Once, in order to attract more participants, he undertook a "Long March," visiting five bamboo enterprises in three cities on a one-day trip covering 300 km.

This pace is quite normal between July and September every year, when Li goes about attracting investment. Quite often he is too preoccupied to sleep or eat. After years of such running about, his mind retains a complete picture of the distribution of every bamboo enterprise in China.

On his business tours, Li displays to his customers Yong'an's strength, confidence and determination in developing its bamboo industry. As a result, they not only come to the Fair, but some come to sign agreements of intent for long-term cooperation with Yong'an bamboo enterprises. For instance, in 2015, Li visited 90 enterprises in southern China, nearly 60 of which attended the Fair and joined the China Bamboo Brands Alliance.

Hard work will always pay off in the end. Yong'an's fame as "land of bamboo" has been on the rise, thanks to the Yong'an-based China Bamboo Brands Alliance, the Yong'an International Bamboo Fair, Yong'an International Bamboo World Forum and Yong'an International Bamboo Design Competitions. In 2016, the International Network for Bamboo and Rattan agreed to its becoming an important international partner.

Spurring the Villages Toward a Bamboo Economy

On May 17, 2016, Li was appointed deputy Party secretary of Xiaotao Town, Yong'an. The bamboo industry was part of his work remit.

Xiaotao Town is rich in bamboo resources, in itself a good foundation for a

bamboo industrial chain. Within a month of his appointment, Li made investigations in major bamboo villages and local bamboo-processing enterprises, and helped them onto the path of green and creative development based on their strengths. Here are a few examples.

Wudi Village is a large bamboo village with 30,000 *mu* (2,000 hectares) of bamboo forest. Within half a year, Li helped Wudi improve its forest management, adjust the forest composition, and improve its infrastructure. He also guided the local Huaifu Bamboo Products Company to open a 600 *mu* (40 hectares) of bamboo raw material base in Wudi Village, and to establish long-term relations between production and marketing, in compliance with the “enterprise plus base” model of cooperation.

Another example is Huachang Bamboo Products Co., Ltd., based in Changban Industrial Zone of Xiaotao Town. Li would visit the company at least four or five times a month. In the eyes of its general manager Tao Zongjing, Li is well-informed about the bamboo industry and has creative ideas about it. He has helped the company a lot by guiding its transformation to a bamboo deep-processing business. As a result, after the construction of new buildings and technological innovations, the company is more than a supplier of bamboo furniture and timber. Today, it manufactures a series of bamboo products used in kitchens, dining rooms and bathrooms. In addition, it cooperates with online retailers to better realize its “bamboo dream.”

For years, Li has been support and witness to Yong’an’s sustained and remarkable progress. Yong’an is China’s only Forest Demonstration Zone, “China’s land of bamboo and bamboo shoots” and “China’s land of bamboo,” and the brand of Yong’an bamboo products is popular far and wide.

The Entrepreneurial Path of a Bamboo Village Leader

Mr. Shao Xiaoping, leader of Fude Village, Chun'an County, Zhejiang Province



The Zhuyuan (Bamboo Passion) Restaurant is known to everybody in Shilin Town, Chun'an County, Zhejiang. It is an out-of-the-ordinary farmhouse built of bamboo both inside and out, a testament to the owner's passion for bamboo. He is Shao Xiaoping, Party secretary of Fude Village and also an ordinary forestry farmer.

Shao Xiaoping's attachment to bamboo dates back to October 2009 and his first attendance at an On-site Demonstration to Promote the Winter Sprouting of Spring Bamboo Shoots, sponsored by the Provincial Department of Agriculture. After the meeting, he found it hard to believe the message of the training — that spring bamboo shoots could be made to sprout in winter. Without seeing it with his own eyes he would not believe it. This incredible idea gave rise to a plan for the future.

Shao's experience at the demonstration haunted him long after his return. After long consideration, he decided to risk investing in the cultivation of bamboo. In June 2010, in the Moso bamboo forest he contracted, he set out on his entrepreneurial dream of "spring bamboo sprouting in winter." He selected five *mu* (3,333 square meters) on which to conduct a trial and covered it with a thick layer of chaff as if to warm up the emerging shoots with a quilt. Fearful that the bamboo seedlings might be "thirsty" after their long "sleep" below ground, he spent RMB100,000 installing faucets at 20-meter intervals. He also built a water reservoir in case of emergency.

Having made every preparation, Shao roamed in his forest every day, hoping to spot the tips of bamboo shoots poking up through the earth. One day went by, and then another... December came and there was still no sign of the beautiful picture he had envisioned. His dream was in pieces. Not a single shoot had pushed through the ground. Every day, in a desperate attempt to find bamboo shoots, he would feel with his hand under the chaff in different places. It was in vain.

His investment had gone down the drain. But this initial business failure did not mean he would throw in the towel. Instead, he went to Anji, Suichang, Lin'an and other

places to exchange experience with other farmers and learn from them. After a few months of study, he regained confidence. In June, he started a second attempt, this time reducing the original five *mu* test base to three *mu*. He first got workers to remove the old, sickly, weak and flowering bamboos before applying composite fertilizer at 100 kg of per *mu* and working over the whole area with a two-pronged hoe.

As for insulation, he stuck to chaff for its insulating power. In September, he had the forest irrigated and the soil enriched with 25 kg of urea and 50 kg of composite fertilizer per *mu*, in addition to fertilizer prepared specially for sprouting and budding shoots. In late November, he drenched the forest once more and applied another 30 kg of urea and 50 kg of composite fertilizer so that the bamboo buds could absorb enough water and nutrients. In mid- and late December a thick mulch of chaff was applied and a covering of plastic insulation film was put around at a height of 70 cm. Another long wait followed. For nights on end, Shao lay in bed sleepless and restless, thinking of his three *mu* of bamboo forest.

Every day at dawn, he would go up the mountain. Twenty-five days passed with nothing to report, but on the 26th morning an ecstatic Shao exclaimed: "They're out! They're out! My bamboo shoots are coming out!" At the sight of these "little mounds," Shao could not contain his excitement.

That year, the yield of bamboo shoots was 1,860 *jin* (930 kg) per *mu* and, calculated at RMB8 per *jin*, one *mu* alone brought him RMB14,880. Besides, the peel of a bamboo shoot is also salable, so 2,000 *jin* (1,000 kg) of peel can be produced per *mu*, which, calculated at RMB3 per *jin*, one *mu*'s output would be worth RMB6,000, greatly raising output and revenue per *mu*. The news that Shao's bamboo could also sprout in winter spread like wildfire in Shilin Town, producing an unending stream of villagers seeking his advice and guidance. Consequently, the size of the "spring bamboo sprouting in winter" base in Shilin increased to 500 *mu* the following year. Under Shao's technical guidance, bamboo shoots came out all over the 500 *mu* base, substantially boosting the villagers' incomes.

Encouraged by the first fruits of entrepreneurship, Shao Xiaoping's passion for bamboo knew no bounds. He not only opened a bamboo products processing plant, but also led the villagers in pursuing a forestry economy.

In 2016, Shao became the first person in Chun'an County to interplant bamboo fungus in a Moso bamboo forest. Every day at dawn, he and his workers would enter the base with infinite care, baskets in hand, since the fungus had to be gathered before 9 p.m. and steps taken immediately to preserve them lest they shrivel. "Bamboo fungus can be harvested as early as June through until September. They can bring more than RMB10,000 in revenue per *mu* and they do not impact the winter or spring bamboo shoots," said Shao. Interplanting bamboo fungus under a bamboo forest can not only enhance the productivity of the forest but also improve the soil and help the bamboo grow, thus achieving many purposes with one action.

As for the future, Shao Xiaoping believes that his top priority as village leader is to set a good example to the other villagers so that they too can get rich. His most pressing task is to lead the villagers in tapping local resources to develop the economy.

An “Indigenous Expert’s” Tricks of the Trade

Mr. Yang Guosong, a villager of Longgong Village, Yong’an City, Fujian Province, and an “indigenous expert” in bamboo cultivation



He is a farmer through and through; for 32 years, he has put body and soul into running his 100 *mu* (6.66 hectares) of bamboo forest, amassing years of experience and knowhow. He is Yang Guosong, Party committee secretary of Longgong Village, Shangping Town in Yong’an City, a dab hand at bamboo cultivation and an “indigenous expert.”

“Sweaty Body, Muddy Legs and a Bamboo Knowhow Brain”

Yang Guosong’s “trademarks” are the yellow mud that’s always splattered over his clothes, from his jacket down to his trousers to his cloth shoes, and the sweat that always glistens on his forehead.

Spreading fertilizer, digging up bamboo shoots, and felling... for more than 30 years, Yang has literally lived with the bamboo forest in symbiosis. As bamboo farmer born and bred here, he doesn’t understand high theory; yet from his years of bamboo cultivation experience, he has mastered unique skills and formed his own way of bamboo forest management.

Yang says, “To achieve efficient management of bamboo groves and turn the hills of bamboo into ‘hills of gold,’ you have to be really particular about every aspect of the process: fertilization, retaining shoots, irrigation channeling, retaining plants, etc.” What he means by being “really particular” is actually the experience he has amassed over many years.

In fertilization, for example, Yang Guosong’s “tricks of the trade” are easy to understand and popular with the forest farmers. Under his leadership, the villagers employ measures according to the particular circumstances. For instance, they apply fertilizer between April and late May to bamboo groves at an altitude of over 500 m, but wait until early June for those below 500 m. In a bamboo grove with 100 to 180 plants, 600 to 800 *jīn* (300 kg to 400 kg) of organic fertilizer is applied.

In addition, Yang Guosong has his “home-grown theories” about bamboo cutting, irrigation channels, retaining bamboo shoots and plants, which he is happy to talk about if anyone asks for help.

Bamboo Knowhow Passed On by a Local “Coach”

Ten years ago, Yang Guosong went into a cooperative relationship with Mr. Chen, the head of a bamboo processing enterprise in Shaxian County. The 800 *mu* (53.3 hectares) of bamboo forest that Chen contracted was “invaded” by locusts, and, in no time at all bamboo leaves over an area of 600 *mu* (40 hectares) were lost. Looking at the stripped stems, Chen was rent with anxiety. He organized workers to do several rounds of pest eradication, but it had little effect. He had no choice but turn to Yang who made an on-the-spot investigation and produced an appropriate remedy. Within just three months, Chen’s forest flourished with new green leaves.

Locusts are the natural enemy of bamboo, but Yang has an “indigenous method” to deal with them. Through careful observation, Yang knew locusts’ living habits. He learned that they tend to fly downwards at 11a.m.; then he mixed “trichlorfon” insecticide with human urine and bound it to the bamboo joints; he knew the locusts would be attracted towards the urine, and by taking advantage of this habit, he wiped them out with a truly convenient and effective remedy.

Equipped with such “unique skills,” Yang has gradually won fame as an expert in bamboo cultivation. Farmers from different villages and towns would turn to him if their bamboo groves were “ailing.”

Trying New Ways, Opening Up the Road to Wealth

In 1984 when the forestry production responsibility system was implemented, Yang contracted for a bamboo forest, but the extensive management mode meant it made little profit. He farmed an area of more than 100 *mu* (6.6 hectares), but a full year of toil produced an income less than RMB9,000. How to change the mode and improve the economic performance? Yang Guosong pondered long and hard.

Under the guidance of bamboo industry experts, Yang Guosong quickly mastered the growth cycles of bamboo. Understanding the incubation period of bamboo shoots, he applied fertilizer in advance of this and, indeed, the winter bamboo shoot pilot area did produce double or triple the output of the regular zone, and their income for that year rose to nearly RMB20,000.

Yang Guosong was exhilarated by the initial success of his experimental “digging for gold” in the forest earth, so he gradually expanded the pilot area from three *mu* to five *mu* and later to 10 *mu*. Following the production cycle of winter bamboo shoots, he repeatedly tested and adjusted the fertilization time, and accumulated rich experience through years of observation. As a result, his yield of winter bamboo shoots grew like sesame flowers — shooting up higher and higher, and his income

multiplied several times over.

In 2005, Yang, now rich in bamboo cultivation knowhow and management experience, led four villagers in a bold investment. They mortgaged the Certificate of Forest and Woodland Tenure Rights of over 400-*mu* (26.6 hectares) bamboo forest for a bank loan of RMB130, 000 to cover fertilization, opening of short cuts into the bamboo forests, and other infrastructure construction. It contributed to more households shaking off poverty and becoming prosperous.

Since 2009, Yong'an City has obtained, in three consecutive rounds, RMB33.5 million from the Farmer Benefiting Fund, issued jointly by Fujian Provincial Forestry Department and Fujian Provincial Finance Department. At the same time, an annual fund has been provided for project construction to vigorously develop a modern bamboo industry.

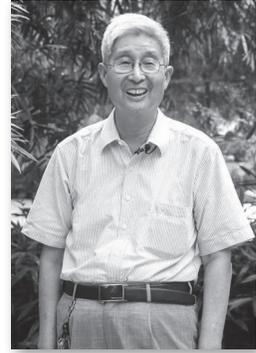
Yang Guosong has played a leading and exploratory role. He took the lead in getting his fellow villagers to join the project. Based on scientific cultivation in the modern bamboo industry demonstration project, he led the villagers of Longgong Village to implement eco-management of bamboo forest, including interplanting with medicinal plants such as *Anoectochilus roxburghii* and *Dictyophora*, and this has greatly improved the standard of management and the eco-management techniques.

After years of exploration in changing ways of management, Yang's bamboo shoot yield increased 10-fold, and his annual income rose to RMB140,000 from a paltry RMB10,000. Under his influence, more than 1,400 households across the township joined in efficient bamboo cultivation and eco-management. By 2014, it had an operational area of 40,000 *mu* (26.6 hectares).

A happy Yang Guosong said, the fruits of his trial and error experiments can benefit the villagers too, and lead them to wealth together, which means his resolute hard work over the years has not been in vain.

Years of Service as “Chief Bamboo Engineer”

Mr. Wang Anguo, chief engineer of the Forestry Bureau of Lin'an City, Zhejiang Province



Lin'an City in Zhejiang has long been known for its bamboo shoots. However, in the 1980s, the farmers of Lin'an, despite being excellent growers of bamboo shoots, were unable to shake off poverty for a long period. It was then that Wang Anguo, a 1967 graduate of the Zhejiang Forestry College, began his 30-year career of serving bamboo farmers with science and technology in the capacity of chief engineer of forestry science of the Forestry Bureau of Lin'an.

As chief engineer of the Forestry Bureau, Wang Anguo has always accorded paramount importance to disseminating technology; his work style has always been one of seeking truth from facts and with unstinting efforts.

He founded the Lin'an Modern Forestry Science and Technology Service Center, and established an area of 1,050 *mu* of modern forestry science and technology park known as the Taihuyuan Garden of Bamboo Species. The collection includes 208 rare species of bamboo in 25 categories, among which is the elegant Guanyin bamboo, lute-string bamboo, Xiangfei “teardrop” spotted bamboo, the grotesque Luohan bamboo, the tall *Phyllostachys heterocyclus pubescens*, and the *Phyllostachys heterocyclus* (Carr.) Mitford that resembles a turtle shell.

He uses the park as a platform for gathering experts from various places, including universities and research institutes, to experiment with all sorts of bamboos, and also as a base for training bamboo-related personnel for rural China and other parts of the world. More than 100 bamboo technology demonstration households have been trained and organized into bamboo shoot specialist cooperatives, so that the park has become a service platform for bamboo-based modern technology research and development and promotion.

Over the past 30 years, Wang Anguo has completed 56 scientific research and promotion projects, of which eight are internationally acknowledged, 32 have won awards at various levels and six have won second prizes at the provincial level.

After retiring in 2002, Wang Anguo continued to take part in and preside over more than 15 scientific and technological projects, among them the Research and Demonstration of Key Technology in Tapping and Exploiting Bamboo Shoots Species Resources for High Quality Bamboo Shoots. He won a second prize for scientific advancements awarded by the Hangzhou government, and one second-prize and three third-prize awards from the province for forestry achievements through science and technology. In total, these projects have brought bamboo farmers an additional RMB60 million in revenue.

Wang spares no effort in popularizing the advances made in forestry science and technology.

In 1992, Wang Anguo took part in an agricultural technology promotion project organized by the city of Hangzhou. It was known as “Promoting the Technology for Producing Excellent Edible Shoots Early and in High Yield” and Wang was put in charge of all technology-related matters. Lin’an City made Gaohong Town its focus of promotion. In 1992, Gaohong’s revenue from Leizhu bamboo was RMB2 million; by 1996, it had risen to over RMB20 million. One example was the 101-person No.5 Production Team of Chenjiakan, a project demonstration point. In 1992, the average per capita income from Leizhu shoots was under RMB1,000 per year. However, through the implementation of the project, the team’s income rose to RMB1.02 million in 1996, the per capita income exceeding RMB10,000. This caused a sensation in Lin’an and local farmers began to control and adjust the time of shoots emerging from the ground. As a result, Leizhu bamboo harvest reached 3,000 kg per *mu*, three times the yield of 1992. At present, Lin’an City’s bamboo forest area has increased to 1 million *mu* from half a million in 1983, the annual output value being RMB3 billion. The cause prospers.

Wang Anguo’s persistent efforts in research and promotion of forestry science have led to breakthroughs in key technology. Between 1992 and now, he has brought an additional income of RMB10 billion for the farmers of Lin’an, greatly boosted the scientific development of the forestry industry of the city and accelerated the lifting of 400,000 bamboo farmers out of poverty. In the process he has become popular among local farmers for he brings science and fortune to them.

Wang has a deep-seated affection for the mountains and a high sense of duty. He and his team have long cooperated with INBAR and the Bamboo Center of the State Forestry Administration. Over the past 15 years they have successfully hosted or co-organized 32 international training courses in growing bamboo, sponsored and convened two international seminars, and organized visits or training in the park for more than 2,000 experts, officials, business owners from 68 countries. Every year, he sets aside more than 40 days to visit former revolutionary base areas in Zhejiang, Hainan, Chongqing, Sichuan, Shaanxi and Hunan, etc., ethnic minority areas and state-designated poverty-stricken counties, to help alleviate poverty

through science and technology. By publicizing the concept of ecological progress and promoting modern forestry technology, he endeavors to transform the old “red” bases into “green” bases. Over the past decade, he has offered 21 training courses in the old revolutionary areas and over 80 on-site instruction sessions; he has guided Baisha County of Hainan Province in the establishment of Taiwan giant bamboo bases totaling over 60,000 *mu* and Qingshen County of Sichuan Province in the establishment of Leizhu bamboo bases totaling 10,000 *mu*.

In recent years, Wang Anguo has been to many developing countries such as the Philippines and Chile for scientific cooperation in growing bamboo; he has introduced Lin’an bamboo species into these two countries and excellent shoot species bred in Lin’an to Rwanda. The Taihuyuan Garden of Bamboo Species has become a training base for scientific cooperation in bamboo technology among the countries along the Belt and Road in Southeast Asia, Africa and Latin American.

Bamboo Industry Association Promotes the Healthy Development of Yong'an's Bamboo Incense Stick Industry



Mr. Liu Wengui, secretary-general of the Bamboo Incense Stick Chapter of the Yong'an City Bamboo Industry Association, Fujian Province

Twenty years ago, Liu Wengui, secretary-general of the Bamboo Incense Stick Chapter of the Yong'an City Bamboo Industry Association, began to get involved in the production of bamboo incense sticks and became an expert on it. For more than a decade, with the Bamboo Incense Stick Chapter as base, he has assiduously built a platform for bamboo incense stick enterprises in Yong'an, Fujian Province and provided them with support, a participant in and witness to the growth of Yong'an's bamboo incense stick industry.

Incremental Improvement Bit by Bit, Just Like Bamboo Grows

In 1997, Liu Wengui and his brother set up a bamboo incense stick factory in Yong'an, their hometown, and sold their products to Taiwan and Southeast Asia via the Xiamen market. At that time, Liu would frequently visit Xiamen in order to pursue sales and chase up payments, staying there for a week or two each time.

Before 2000, a lack of drying equipment meant that the final bamboo incense stick drying process was inevitably subject to weather constraints. Of course, this inevitably held back production and annual output barely exceeded 100 tons.

Later, Liu purchased drying equipment for the factory so that even on rainy days production could go on uninterrupted. In 2003, he got rid of a batch of outmoded equipment, replacing it with technology developed independently by local enterprises of Yong'an and tailored for the processing of local bamboo. This he dubbed "my right-hand man." As a result, the straightness and fineness of the bamboo incense sticks were considerably improved and production rose significantly.

The material used to produce bamboo incense sticks is the bark of Moso bamboo, the outermost layer of the bamboo stem. Now, as well as bamboo incense sticks, Liu Wengui's factory and many other ones use the inner part of the culm to make bamboo curtains, container boards and construction shuttering. Scraps and off-cuts

are supplied to other enterprises as boiler fuel or raw material for carbon making, so that every single advantage of bamboo is exploited.

Expanding Markets Smoothly Like Splitting a Bamboo

The bamboo incense stick industry in Yong'an started to grow in the 1980s. In 2003, the Yong'an City Bamboo Industry Association established its Bamboo Incense Stick Chapter to provide services such as exchange of experience, business training, and technology and information sharing. It has acted as a link for the common development of its more than 30 member enterprises.

As secretary-general of the Bamboo Incense Stick Chapter, Liu Wengui spends a great deal of time helping member enterprises to build up their capabilities, expand markets and enhance profit margins.

Earlier, bamboo incense sticks from Yong'an were shipped to Xiamen to be sold to domestic and foreign markets by agents and dealers. The price differential went into the pockets of these intermediaries, greatly reducing the profit margins of the producers.

Magang in Xiamen and Jiangmen of Guangdong Province are China's two major trading centers for bamboo incense sticks. Since 2008, Liu Wengui and more than 10 members of the chapter council have visited Jiangmen many times to investigate, learn and exchange experience, with a view to expanding markets and developing Yong'an's bamboo incense stick industry through building up its strengths while exploring new sales avenues. Liu takes his role of "market representative" for member enterprises very seriously because it publicizes more widely the excellence of Yong'an bamboo incense sticks. Now, in addition to selling to Xiamen, member enterprises ship goods directly to Guangdong from Yong'an; some have set up distribution outlets in Jiangmen to achieve direct supply from producers. Meanwhile, through secondary and tertiary agents, Yong'an bamboo incense sticks are also sold to India and Southeast Asian countries including Malaysia. In peak season, more than 20 containers a month are exported, each one weighing about 20 tons.

For the products to sell well on the market, standardized and certified quality control is of paramount importance. In 2013, in conjunction with the Forestry Science and Technology Promotion Center of Yong'an City, Fujian Agriculture and Forestry University, and Forestry Science and Technology Promotion Center of Fujian Province, the Bamboo Incense Stick Chapter drafted the Standards for the Member Enterprises of the Bamboo Incense Stick Chapter of the Yong'an City Bamboo Industry Association. This laid down technical requirements and inspection rules for bamboo incense sticks, as well as for logos, packaging, transportation and storage. Liu Wengui was involved in the drafting from start to finish and contributed to standardization in the bamboo incense stick industry and its development.

In 2013, under the guidance of the Forestry Bureau of Yong'an City, Liu Wengui

also participated in every stage of FSC (Forestry Stewardship Council) bamboo forest management and forest area certification, with the Bamboo Incense Stick Chapter as the subject. After a year's strenuous work, the Chapter passed the certification test in April 2014, the certified area being 135,300 *mu* (9,000 hectares) of which 108,800 *mu* (7,250 hectares) are bamboo forests. In this way, the problem of providing FSC-compliant raw material for local bamboo incense stick exporting enterprises was solved, which gave forestry and bamboo enterprises an impetus to further expand their international market.

Serving Bamboo Enterprises Well as “Logistical Support”

Since the establishment of the Chapter, membership has expanded beyond 70 enterprises, employing more than 2,000 people.

Throughout its existence, Secretary-General Liu Wengui has always been on hand to help member enterprises in every possible way, for example obtaining transportation permits and paying forestry fees on their behalf, saving them a lot of trouble.

As a mediator on the Labor Disputes Mediation Committee of the Bamboo Incense Stick Chapter, Liu Wengui works hard as a “peacemaker.” The disputes mediated by him have all been satisfactorily resolved, without any subsequent appeals for reconsideration to the local labor arbitration department of Yong’an.

In recent years, environmental protection has made its way to center-stage. Accordingly, Liu Wengui visits member enterprises to publicize and promote technological reform compliant with environmental protection; he also applies to the environmental protection and forestry departments for policy subsidies on behalf of these enterprises. His efforts have paid off. More than 10 bamboo incense stick enterprises have built safe and environment-friendly drying chambers, six of them with forced air circulation and four using bio-fuels.

In June 2016, the Bamboo Incense Stick Chapter of the Yong’an City Bamboo Industry Association was awarded the title of National Advanced Unit in Reviving Rural Areas Through Science by the China Association for Science and Technology and the Ministry of Finance. Liu Wengui’s contributions have helped bring about these achievements.

图书在版编目(CIP)数据

绿竹人生:100位中国竹业人物故事集锦:英文/国际竹藤组织编.

—北京:外文出版社,2017.10

ISBN 978-7-119-11069-1

I. ①绿… II. ①国… III. ①竹材-工业产业-人物-先进事迹-中国-英文

IV. ①K828.9

中国版本图书馆CIP数据核字(2017)第251877号

统 筹:李智勇 吴君琦

英文翻译:董 明 陈文娟 江 丹 司文会 孙礼中 严 晶

英文审定:Sue Duncan 徐汀汀 王 琴 李 洋

英文编辑:王 琴 徐汀汀

责任编辑:杨春燕

装帧设计:北京夙焉图文设计工作室

封面设计:北京经典无限广告有限公司

印刷监制:冯 浩

绿竹人生:100位中国竹业人物故事集锦

国际竹藤组织 编著

出版人:徐 步

出版发行:外文出版社有限责任公司

地 址:北京市西城区百万庄大街24号

邮政编码:100037

网 址:<http://www.flp.com.cn>

电子邮箱:flp@cipg.org.cn

电 话:008610-68320579(总编室) 008610-68327750(版权部)

008610-68995852(发行部) 008610-68996158(编辑部)

印 刷:北京飞达印刷有限责任公司

经 销:新华书店/外文书店

开 本:787mm×1092mm 1/16

印 张:20.75

字 数:160千字

版 次:2017年10月第1版第1次印刷

书 号:ISBN 978-7-119-11069-1

定 价:98.00元





ISBN 978-7-119-11069-1



9 787119 110691 >