

The Economic Importance of Credible Bamboo Certification in China

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Background

This report updates past Dovetail Reports on bamboo and bamboo certification and describes bamboo's role as an essential part of the history of human civilization, notably in Asia and South America.¹ Bamboo is still used in its traditional way to make basic materials such as writing scrolls, baskets, clothing and shoes, food, and building materials.² However, bamboo has also grown to be a global commercial input material, where its top "end-use" industries are furniture and construction, followed by food, pulp and paper, textiles, and agriculture.³ Part of facilitating its entrance into the global market was the widespread marketing of bamboo as a more sustainable substitute for wood products, the "green mythology for bamboo," as referenced in Dovetail's 2014 Report.⁴ This report resists the idea that rapidly renewable materials are automatically environmentally friendly and responds to the spread of misinformation surrounding renewability with an analysis of China's bamboo resources and a review of literature detailing the various environmental impacts of bamboo industry expansion. These include biodiversity loss and ecosystem service decrease due to intensive management practices and the creation of monocultures; the clearing of forests and exploitation of forest resources; destructive use of fertilizer, herbicides, and pesticides; and finally, the high quantity of water required for bamboo production.

Bamboo's rapid renewability underpins its growth from an economic perspective, however, and the bamboo industry plays an important role in China's economic development in particular. The "Kingdom of Bamboos" is the world's largest producer and exporter of bamboo,⁵ and the resource continues to play an important role in Chinese culture as well.⁶ In their promotion of bamboo production, the Chinese government has had to balance international demand and production standards with traditional Chinese values, a challenge that has shown up significantly in certification efforts.⁷ The 2014 Dovetail report briefly addressed the issue of forest certification,⁸ mentioning how, at the time of writing, the only widely available medium of certification for bamboo was through the Forest Stewardship Council (FSC), and pointed out critiques of certification, such as its cost and the barriers created for smallholders.⁹

¹Jim Bowyer et al., "Bamboo Flooring Environmental Silver Bullet or Faux Savior?" Dovetail Partners, March 15, 2005, <https://www.dovetailinc.org/portfoliodetail.php?id=5e8f41b727ea9>; Jim Bowyer et al., "Bamboo Products and their Environmental Impacts: Revisited," Dovetail Partners, March 10, 2014, <https://www.dovetailinc.org/portfoliodetail.php?id=5e2f0df258c14>.

²Tania Yeromiyani, "The Culture and History of Chinese Bamboo," Chinese Language Institute, June 27, 2021, <https://studycli.org/chinese-culture/chinese-bamboo/>.

³"Bamboos Market," FMI, July 2022, <https://www.futuremarketinsights.com/reports/bamboos-market>.

⁴Bowyer et al., "Bamboo Products."

⁵"Shooting Upward: Bamboo and Rattan Trade," INBAR, April 28, 2021, <https://www.inbar.int/shooting-upward/>; "Bamboo Used Primarily for Plaiting Exports by Country in 2021," WITS, World Bank, 2021, <https://wits.worldbank.org/trade/comtrade/en/country/ALL/year/2021/tradeflow/Exports/partner/WLD/product/140110>.

⁶Yeromiyani, "Culture and History."

⁷Kathleen Buckingham and Paul Jepson, "Forest Certification with Chinese Characteristics: State Engagement with Non-state Market-driven Governance," *Eurasian Geography and Economics* 54, no. 3 (2013): 280–299, <https://doi.org/10.1080/15387216.2013.849850>.

⁸Though this report centers around forest certification for bamboo, an increasing number of bamboo products, textiles specifically, are receiving organic certification.

⁹Bowyer et al., "Bamboo Products."

¹⁰Buckingham and Jepson, "Forest Certification with Chinese Characteristics."

¹¹Alba Rocio Gutierrez Garzon et al., "A Comparative Analysis of Five Forest Certification Programs," *Forests* 11, no. 8 (2020): 1–21, <https://doi.org/10.3390/f11080863>.

¹²Wenming Lu and Maharaj Muthoo, "Progress of Forest Certification in China," *Frontiers of Agricultural Science and Engineering* 4, no. 4 (2017): 414–420, <https://doi.org/10.15302/J-FASE-2017185>.

¹³"Our History," FSC, accessed January 27, 2023, <https://fsc.org/en/our-history>.

¹⁴Buckingham and Jepson, "Forest Certification with Chinese Characteristics."

¹⁵"FSC Public Certificate Search," FSC, accessed January 27, 2023, <https://connect.fsc.org/fsc-public-certificate-search>.

Overview of Forest Certification

Early forest certification efforts were a response to growing environmental concerns in the 1990s, which spurred a desire for more sustainable forest management and an increasing prevalence of environmental Non-Governmental Organizations (NGOs).¹⁰ Since then, certification efforts have developed rapidly in cooperation with major retailers and forest producers. Forest landowners utilize certification to address market requirements and improve their public image.¹¹ A variety of regional-specific certification programs have been active since then, with over 40 countries having national programs as of 2017.¹² However, only two programs, the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC), have attained global reach. The two programs have fundamental differences. A partnership of NGOs and retailers spearheaded the FSC in 1993 and applied its system of “10 principles and 57 criteria” to certified forests in countries around the world.¹³ The FSC is member-led with a centralized and independent accreditation body. The PEFC was born in 1999 out of the demand from individual European countries for a more flexible system of certification that could reflect country-specific needs.¹⁴ The PEFC operates as an umbrella organization that endorses national and regional-specific certification systems based on their adoption of PEFC sustainability benchmarks. Both the FSC and the PEFC certify bamboo. The FSC lists “bamboo and articles of bamboo” as a product category,¹⁵ whereas bamboo certificates can be found under “other non-wood products” on the PEFC public dashboard.¹⁶

¹⁶“Find Certified,” PEFC, accessed January 27, 2023, <https://www.pefc.org/find-certified>.

¹⁷“Standards and Guides,” PEFC, accessed January 27, 2023, <https://pefc.org/standards-implementation/standards-and-guides>.

¹⁸“Sustainable Forest Management - Requirements,” PEFC, November 28, 2018, <https://standards.pefc.org/the-standards/sustainable-forest-management>.

¹⁹PEFC, “Sustainable Forest Management.”

PEFC Sustainability Benchmarks

PEFC international standards (sustainability benchmarks) dictate all program activities, including providing certification solutions, assessing compliance with certification regulations, and endorsing national certification systems.¹⁷ Standards are updated every five years, and current standards have been in place since 2018. PEFC-endorsed regional and national systems adapt and apply these standards at their respective levels.

Certified individuals or organizations are those whose compliance with PEFC requirements has been validated. PEFC ensures credibility in this process via three independent processes, defined by the organization in their Sustainable Forest Management Requirements:

Standard setting, the process of defining certification requirements in collaboration with stakeholders, is undertaken by PEFC or regional and national forest certification systems.

Certification, the process of checking whether a forest manager or company fulfills the certification requirements, is carried out by a certification body.¹⁸

Accreditation, the process of assessing the competence of the certification body, is carried out by an accreditation body with membership within the International Accreditation Forum (IAF) or an IAF regional accreditation group.

The standards are organized into the following sections: Context, Leadership, Planning, Support, Operation, Performance Evaluation, and Improvement, where six criteria dictate “Operation”:

Maintenance or appropriate enhancement of forest resources and their contribution to the global carbon cycle

Maintenance of forest ecosystem health and vitality

Maintenance and encouragement of productive functions of forests (wood and non-wood)

Maintenance, conservation, and appropriate enhancement of biological diversity in forest ecosystems

Maintenance or appropriate enhancement of protective functions in forest management (notably soil and water)

Maintenance or appropriate enhancement of socio-economic functions and conditions

Bamboo Certification in China

In China, most forest resources (including bamboo) are owned by the state, except for “collective forest lands,” which may be contracted out to individuals or managed by rural collective economic organizations, according to the Chinese Communist Party (CCP) active Forestry Law.²⁰ Though difficult to quantify, this fact and the tightening relationship between the private sector and the state (see Sidebar: Is China’s Private Sector Shrinking?) reflect the high degree of control the CCP has over bamboo production within China. This control naturally extends to forest certification efforts, which are structured around a division of responsibility between private firms, industry associations, and NGOs in many other countries.

The entry of forest certification into China stretches back to efforts to improve forest management in the late 1990s after China suffered severe flooding,²¹ an event that led to research on forest certification by the Chinese Academy of Forestry in 1995.²² Several years later (1998), China received its first FSC Chain of Custody (CoC) certificate. However, China resisted the widespread institution of FSC certification procedures in China for a variety of reasons, including the lack of demand for FSC certification domestically, the cost of certification, the domination of foreign bodies in the FSC, lack of capacity within the forest industry, and inconsistencies regarding certification of unsustainable producers.²³ The result of these concerns was a desire by the Chinese government to play a more active role in certification within China, with this case again strengthened by the Chinese Communist Party’s extensive control of forest production.

The Chinese government worked on the China Forest Certification Scheme (CFCS), their own certification system, from 2001 to 2009. The scheme started operating in 2010 with the establishment of the China Forest Certification Council (CFCC), the governing body of the CFCS. China’s efforts to integrate its system of state control with global forest certification resulted in the CFCS joining the PEFC in 2011. The system received official endorsement in 2014 as an independent national organization “responsible for developing and running the national forest certification system within their country.”²⁴ The certification approach of the PEFC, as opposed to the FSC, was more attractive to the Chinese government, given that the PEFC allows countries to create their own standards so long as they act in accordance with PEFC international standards (see Sidebar: PEFC Sustainability Benchmarks). Buckingham and Jepson highlight the Chinese government’s challenge at the time to appeal to both domestic and international markets while ensuring government authority over the certification mechanism.²⁵ Endorsement a year later appears to have remedied this concern, with the CFCC writing, “Chinese forest certificates were accepted in more than 40 countries, and the logo of China forest certification became the ‘green passport’ for certified products in entering the international market”.²⁶



The CFCC Certified Label is used on products that include a minimum of 70% of materials from CFCC-certified forests.

²⁰“Forest Law of the People’s Republic of China,” NPC, December 28, 2019, <http://www.npc.gov.cn/englishnpc/c23934/202012/170ad07d186b4a2ab6b7fac21e57f69e.shtml>.

²¹Buckingham and Jepson, “Forest Certification with Chinese Characteristics.”

²²Lu and Muthoo, “Progress of Forest Certification.”

²³Buckingham and Jepson, “Forest Certification with Chinese Characteristics.”

²⁴“Our PEFC Members,” PEFC, accessed January 27, 2023, <https://www.pefc.org/discover-pefc/our-pefc-members>.

²⁵Buckingham and Jepson, “Forest Certification with Chinese Characteristics.”

²⁶“China Forest Certification Council (CFCC),” National Members, PEFC, accessed December 1, 2022, <https://www.pefc.org/discover-pefc/our-pefc-members/national-members/china-forest-certification-council-cfcc>.

Although the China Forest Certification Council (CFCC) is the only national organization in China, the FSC maintains a significant presence in China's certification market. FSC-certified forest area in China was 1,291,644 ha (~0.6% of national forest coverage), and the FSC awarded 94 Forest Management (FM) certificates and 16,933 Chain of Custody (CoC) certificates.²⁷ By comparison, the PEFC reports 2,291,459 ha of certified forest area (~1.1% of national forest coverage) and 498 Chain of Custody certificates.²⁸ The smaller number of PEFC certificates could be explained by the differing approaches of the two organizations and PEFC's later start. Joint research by the PEFC and the FSC found that as of mid-2022, an estimated 107,197 ha of forest area in China was double-certified. The FSC is active in China in other ways as well. For example, alongside Ukraine, China is the location of a pilot program aimed at improving supply chain sustainability and FSC credibility through information technology.³⁰

Is China's Private Sector Shrinking?

China's famous Reform and Opening Up in 1978 introduced a private sector into a country that formerly operated solely under state-led communism, and it was this private sector that has been responsible for much of China's massive growth since then.³¹ China's current president, Xi Jinping, was initially celebrated as a friend of the private sector and market mechanism, but the reality has been starkly different. Xi's policies have represented a return to a close relationship between the Chinese Communist Party (CCP) and the private sector, and the party today plays a role in the operations of private businesses.³² During the National Conference of the Communist Party, Xi spoke of unwavering support for the private sector and promised that resource allocation would be decided by the market.³³ However, Chinese laws such as the 2017 National Intelligence Law of the People's Republic of China, which states that "all organizations [public and private] and citizens shall support, assist, and cooperate with national intelligence efforts in accordance with law,"³⁴ tell a different story.

Xi has continuously pressured private businesses to give the party a more significant role in operations, encouraging businesses to incorporate party "cells" or organizations into their corporate structure. In the Party Constitution, all organizations in China with more than three party members are required to have a party cell.³⁵ According to a survey collected by the All-China Federation of Industry and Commerce in 2018, 48.3% of surveyed private enterprises had an active party cell. However, many organizations surveyed were relatively small, and 84% reported employing fewer than three party members.³⁶ In the same year, the party's Central Organization Department reported that 73.1% of enterprises had party cells.³⁷ Guidelines published in 2020 state that party cells should be viewed as increasingly important to "guide private enterprises to improve their corporate governance structure and explore the establishment of a modern enterprise system with Chinese characteristics."³⁸

Xi Jinping is promoting the power of the state. However, other factors such as the property crisis in China and rising costs worldwide, may be responsible for recent stalls in private sector growth.³⁹

²⁷"Facts and Figures," FSC, last modified October 2022, <https://connect.fsc.org/impact/facts-figures>.

²⁸"Facts and Figures," PEFC, last modified September 2022, <https://pefc.org/discover-pefc/facts-and-figures>.

²⁹PEFC, "Facts and Figures."

³⁰"Just Around the Block – Blockchain and Revolutionizing Compliance in Supply Chains," FSC, May 10, 2021, <https://fsc.org/en/newscentre/just-around-the-block-blockchain-and-revolutionizing-compliance-in-supply-chains>.

³¹Shen Lu, "In China, the State Sector Is In; Private Sector Stutters," Wall Street Journal, October 22, 2022, <https://www.wsj.com/livecoverage/china-xi-jinping-communist-party-congress/card/in-china-the-state-sector-is-in-private-sector-stutters-jyOYiDqUFiSBHvyyS>.

³²Richard McGregor, "How the State Runs Business in China," Guardian, July 25, 2019, <https://www.theguardian.com/world/2019/jul/25/china-business-xi-jinping-communist-party-state-private-enterprise-huawei>.

³³Kevin Yao, "Xi Says China Will Unwaveringly Support Private Economy," Reuters, October 15, 2022, <https://www.reuters.com/world/china/xi-says-china-will-unwaveringly-support-private-economy-2022-10-16/>.

³⁴"National Intelligence Law of the People's Republic," NPC, June 27, 2017, https://cs.brown.edu/courses/csci1800/sources/2017_PRC_NationalIntelligenceLaw.pdf.

³⁵"Chinese Communist Party Cells in Private Companies: Though Not Yet Universal, Increasingly Situated to Play Greater Roles in Corporate Governance," Sayari, April 7, 2021, <https://sayari.com/resources/chinese-communist-party-cells-in-private-companies-though-not-yet-universal-increasingly-situated-to-play-greater-roles-in-corporate-governance/>.

³⁶Neil Thomas, "Party Committees in the Private Sector: Rising Presence, Moderate Prevalence," Marco Polo, December 16, 2020, <https://macropolo.org/party-committees-private-sector-china/?rp=m&fbclid=IwAR1bDHDjgNqDp9J8GwNLAbRo3hMHTktQocwJXbUb7Th08Zu00bJ9bDuctL8>.

³⁷Matthew Brooker, "Communist Party Cells? Nothing to See Here," Bloomberg, July 28, 2022, <https://www.bloomberg.com/opinion/articles/2022-07-28/communist-party-cells-at-your-company-s-office-in-china-nothing-to-see-here?leadSource=uverify%20wall>.

³⁸Jérôme Doyon, "Influence without Ownership: the Chinese Communist Party Targets the Private Sector," Institut Montaigne, January 26, 2021, <https://www.institutmontaigne.org/en/analysis/influence-without-ownership-chinese-communist-party-targets-private-sector>.

³⁹Huang, Tianlei and Nicolas Véron. "China's Private Sector Advance Pauses, but the Trend is Unclear." Peterson Institute for International Economics, October 17, 2022. <https://www.piie.com/blogs/realtime-economics/chinas-private-sector-advance-pauses-trend-unclear>.

China Forest Certification Council

The PEFC ensures credibility across all national programs in its International Standards, stipulating that the certification program comprises three unique processes. These are standard setting, certification, and accreditation (see Sidebar: PEFC Sustainability Benchmarks).⁴⁰

In the case of China, standard setting and revision are done by the Chinese government per the 2017 Standardization Law of the People's Republic of China.⁴¹

As is necessary for PEFC endorsement, the China Forest Certification Council (CFCC) writes in their Scheme Description that certification bodies are “impartial, independent third parties which cannot be involved in the standard setting process as governing or decision making bodies, [...] and are independent of the certified entity”.⁴² Based on internal procedures and in accordance with China Forest Certification Scheme (CFCS) requirements, these independent bodies award CFCS certification.⁴³ Certification bodies select and train auditors themselves.

Accreditation of certification bodies and auditors is handled by the Certification and Accreditation Administration of the People's Republic of China (CNCA), as is necessary by law. The CNCA is also the accreditation body of the China Forest Certification Council (CFCC). Government “Forest Certification Rules” also mandate that all certification bodies are approved by the government and registered in the Department of Industry and Commerce.⁴⁴ Notably, both standard setting and accreditation of certified bodies are handled by the state and are not independent processes.

In addition to adherence to PEFC international standards, the CFCC maintains its own set of standards, both at national levels and for different forest sectors, and has audit directives and operational manuals for certification bodies and forest producers, respectively.

⁴⁰The following information comes from the CFCC 2011 system documentation. Per PEFC procedure, the CFCC is undergoing a regular assessment, and if the system is re-endorsed, the 2011 documentation will be replaced with updated versions from 2019.

⁴¹“Standardization Law of the People's Republic of China,” CFSTC, April 16, 2018, <https://www.cfstc.org/en/2932583/2968817/index.html#:~:text=This%20Law%20is%20enacted%20to,level%20of%20economic%20and%20social>.

⁴²PEFC, “CFCC.”

⁴³The CFCS is responsible for Forest Management (FM) certification, Chain of Custody (CoC) certification, and other types of certification, including bamboo certification.

⁴⁴Lu and Muthoo, “Progress of Forest Certification.”

The Economic Importance of Accredited Certification

The PEFC has been criticized for its lack of consistency between national programs (see Sidebar: PEFC Criticism and Response), and if widely agreed upon, this criticism may have important implications. High-quality, trusted forest certification programs are necessary not just from the standpoint of environmental protection,⁴⁹ but also from an economic perspective. The following three economic theories have direct relevance to certification. The brief descriptions provide a variety of case studies that affirm the importance of certification in a variety of markets. In the following section of the report, the theories laid out here will be compared with the market for bamboo in China.

Quality Uncertainty and the Market Mechanism

George Akerlof's "The Market for 'Lemons': Quality Uncertainty and the Market Mechanism" is a widely-referenced paper among Economists.⁵⁰ Taking the market for cars as an example, Akerlof lays out the following theory: cars are either new or used, and they are either good or bad, whereas bad cars are called "lemons." There are then four categories of goods in this market. New high-quality cars, new low-quality cars, used high-quality cars, and used low-quality cars. Akerlof writes that since there is no way for an average consumer to know the difference between a high-quality car and a low-quality car, they sell for the same price. There are four categories of products, but only two prices: the price of a new car and the price of a used car. With no incentive to sell good quality cars, the market is flooded with only bad quality cars. Today, United States consumers can access a Vehicle History Report (VHR) from CARFAX, founded fourteen years after Akerlof's paper was published. Access to quality assurance revitalizes the market, and car consumers today pay different prices depending on the quality of a car. Similarly, forest certification can provide additional information to consumers about products that may impact pricing in the marketplace. This connection is further explored in the next section of the report.

Premiums for High Quality Products

In his "Premiums for High Quality Products as Returns to Reputations," Carl Shapiro describes how, in a market under perfect competition with imperfect

PEFC Criticism and Response

The PEFC has received criticism from organizations such as Greenpeace,⁴⁵ who labeled it a "weak and industry-dominated scheme," writing that the International Standards (see Sidebar: PEFC Sustainability Benchmarks) are insufficient in crucial areas such as not prohibiting conversion of forests to plantations and not consistently recognizing Indigenous rights.⁴⁶ The report does not address China specifically but writes that "the certification of highly controversial forestry practices has also been an ongoing concern with a number of PEFC-endorsed schemes around the globe" and that "some important PEFC endorsed national schemes even fall short of the PEFC's international expectations."

The PEFC responded to this report, accusing it of being biased toward Greenpeace's interests and presenting various factual errors. They also shared an assessment conducted by the Dutch Timber Procurement Action Committee which found the PEFC to be "fully compliant with a comprehensive set of sustainability requirements."⁴⁷ According to Buckingham and Jepson, "the degree to which any certification scheme accrues legitimacy will vary between countries, cultures and eras,"⁴⁸ and it is the PEFC rather than any other certification scheme which has gained legitimacy in China.

⁴⁵Greenpeace has made similar statements about FSC and criticized certification in general as failing to prevent forest degradation and ecosystem destruction.

⁴⁶"Destruction: Certified," Greenpeace, March 10, 2021, <https://www.greenpeace.org/international/publication/46812/destruction-certified/>.

⁴⁷PEFC Response to Greenpeace Report 'Destruction: Certified,'" PEFC, March 11, 2021, <https://pefc.org/news/pefc-response-to-greenpeace-report-destruction-certified>.

⁴⁸Buckingham and Jepson, "Forest Certification with Chinese Characteristics."

⁴⁹For more information on the environmental impacts of mismanagement in bamboo production, see the Dovetail report "Bamboo Products and Their Environmental Impacts: Revisited" from Bowyer et al.

⁵⁰George A. Akerlof, "The Market for 'Lemons': Quality Uncertainty and the Market Mechanism," *Quarterly Journal of Economics* 84, no. 3 (Aug 1970): 488–500, <https://www.jstor.org/stable/1879431>.

information available to consumers, better quality items must sell for a higher price.⁵¹ This price is called a “premium,” which is marked up above cost (under perfect competition, prices equal cost, and firms make no profit in the long run). Instead of viewing this premium as a profit, Shapiro describes it as either a return on the firm’s investment into its “reputation” or an incentive to continue producing at high quality. The firm’s “reputation” is the information on the quality of goods produced in the past that is available to consumers (for example, Amazon consumer reviews).

While investing in forming a good reputation, firms experience a period of losses followed by a stream of profits once their reputation is established. The premium for higher quality products must be large enough to compensate for this period of losses and prevent producers from decreasing quality in the short run to cut costs. Cutting costs in the short run is an option that producers can consider, given that consumers have perfect information about price and the firm’s “reputation” or past performance but lack information about the actual quality of the goods produced today. Shapiro factors this lack of information into the model as a “markup” over cost, where less information about the quality of a product causes an increase in the price. As this markup increases, consumers substitute for lower-quality goods, and consumer welfare decreases for consumers who prefer high-quality goods. Producers prefer a higher markup because it places a higher value on their good reputation.

Shapiro also addresses minimum quality standards for production, where a higher minimum quality standard is associated with a lower premium. This has a similar effect on consumers as the lower markup: consumers who prefer high-quality goods benefit, and as a result, Shapiro argues that minimum standards should be binding. The establishment of standards and the impact on producer reputation are both applicable to understanding the economic importance of accredited certification, as discussed further in the next section.

Competitive Provision of Quality

GianCarlo Moschini, Luisa Menapace, and Daniel Pick address certification in their paper “Geographical Indications and the Competitive Provision of Quality in Agricultural Markets.”⁵² Geographical indications are a form of certification that verify that a product labeled as being produced in a specific region is actually produced there (Florida oranges, Irish whiskey, etc.). The authors first assert that certification is necessary, given that individual firms lack the power to signal quality to consumers on their own. Moschini, Menapace, and Pick then describe how credible certification solves Akerlof’s “lemons” problem, where a competitive provision of quality products is possible through certification. The resulting equilibrium demonstrates welfare gains relative to a situation without certification but is not Pareto efficient and under-provides high-quality goods. Pareto efficiency is a situation where every individual is as well-off as possible. An equilibrium that is not Pareto efficient implies that one or more agents (producers, consumers, etc.) are unsatisfied. In this case, producers benefit the least, as is the same case described by Shapiro. Moschini, Menapace, and Pick contend that Pareto efficiency can be restored if the government subsidizes fixed costs of certification. To date, global forest certification programs have primarily operated without significant government involvement; however, in China, the state’s role is more significant.

⁵¹Carl Shapiro, “Premiums for High Quality Products as Returns to Reputations,” *Quarterly Journal of Economics* 98, no. 4 (November 1983): 659–680, <https://www.jstor.org/stable/1881782>.

⁵²GianCarlo Moschini, Luisa Menapace, and Daniel Pick, “Geographical Indications and the Competitive Provision of Quality in Agricultural Markets,” *American Journal of Agricultural Economics* 90, no. 3 (Aug 2008): 794–812, <https://doi.org/10.1111/j.1467-8276.2008.01142.x>.

The Market for Bamboo in Theory

Following the case laid out by Akerlof, there should be four types of bamboo on the market. These are certified sustainable bamboo, certified unsustainable bamboo, uncertified sustainable bamboo, and uncertified unsustainable bamboo. These distinctions are crucial because, without them, asymmetric information could cause the market for sustainable bamboo to implode. When consumers cannot investigate the production process and determine levels of sustainability themselves, certification must be credible. When it is not, bamboo is only sold in two price categories: certified and uncertified, regardless of the bamboo's actual sustainability level. Without an incentive to produce sustainably, firms move only to produce unsustainably regardless of certification status, and the market is flooded with unsustainable bamboo. Dishonest producers drive honest producers out of the market, and the costs of this dishonesty are high, both in the amount the consumers were cheated and the losses incurred from driving legitimate firms from the market. Akerlof's conclusion that a multi-step certification and accreditation process needs to occur if consumers are to trust quality standards was satisfied through the China Forest Certification Council's processes. Robust oversight of this certification scheme and all others is necessary to ensure that certified producers are not producing unsustainably and driving sustainable producers from the market.

Shapiro addresses how certified firms manage to produce unsustainably without losing certification status. A firm's "reputation" is its certification status, a measure of sustainability at a past moment in time (the period of initial certification or most recent audit). Producers can decrease sustainability in the present moment and not lose certification status until the next audit occurs. This possibility reflects Shapiro's point that consumers have perfect information about the price of goods and the firm's past performance/certification status but not their current level of sustainability in production. In order to disincentivize producers from acting dishonestly, sustainable bamboo products must sell for a premium above cost, and the premium must be large enough to act as a return on investment in more sustainable production practices by bamboo producers and to act as an incentive to continue producing sustainably. Another point by Shapiro could articulate why certification costs are often considered a barrier,⁵³ as sustainability in production is a quality attribute that is very difficult for consumers to observe, particularly in the case of foreign consumers of bamboo. This makes establishing a good reputation for high-quality certification more difficult and costly, and a large cost increase could lead to consumers substituting sustainable bamboo for unsustainable bamboo. To avoid this situation, thorough cost-benefit analyses need to be conducted by producers when making decisions regarding bamboo certification.

In turn, Moschini, Menapace, and Pick provide a solution to fixed cost increases, writing that subsidizing bamboo certification could return the market to a better outcome, where producers are sufficiently incentivized to continue producing sustainably after the period of their most recent audit. The State Forestry Administration commissioned studies of three forms of subsidization of bamboo certification: (1) direct subsidization of producers where the subsidy value would be based on the area of certified bamboo forest under management or annual sales of certified bamboo, (2) indirect subsidization of buyers where the subsidy amount would be a percentage discount off of market price, or (3) a combination of the two forms of subsidies.⁵⁴ China uses various subsidy programs to promote sustainable bamboo production. These include the Bamboo Afforestation Subsidy, which is a direct subsidy to bamboo farmers, cooperatives, and contract workers on state-owned forest lands, funding for science and technology investment within the bamboo industry, and tax exemption programs for farmers.⁵⁵

⁵³Buckingham and Jepson, "Forest Certification with Chinese Characteristics."

⁵⁴Lu and Muthoo, "Progress of Forest Certification."

⁵⁵Baoshan Tao et al., "Subsidies for Bamboo Afforestation in China," International Bamboo and Rattan Organization, 2018, https://www.inbar.int/resources/inbar_publications/subsidies-for-bamboo-afforestation-in-china/.

The Bottom Line

The formation of a national forest certification program in China with PEFC endorsement seems to address both China's unique system of state influence over production and the international demand for sustainably produced bamboo. A review of economic literature suggests that all certification schemes, including the China Forest Certification Council, must have multi-step and separate processes of standard setting, certification, and accreditation to encourage efficient market operations and environmentally sustainable production. Additionally, this production needs to be incentivized at a significant enough level so that producers do not behave opportunistically and decrease sustainable practices in the short run. Ideally, this incentive would come in the form of higher revenues for producing sustainable bamboo, assuming it sells at a higher price than unsustainable bamboo. If price differences were large enough to encourage consumer substitution towards unsustainable bamboo, economic literature such as the paper written by Moschini, Menapace, and Pick argues that subsidization of production could act as an incentive for sustainable practices while reducing the price of certified bamboo for consumers. Though subsidization of bamboo is existent, further studies could compare subsidy programs in China for their effectiveness in encouraging the consumption of certified bamboo over that of uncertified bamboo. Although this paper focuses on bamboo certification in China, the conclusion that accredited certification processes coupled with incentives for sustainable production lead to economically and environmentally desirable outcomes is not country-specific.

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