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The Marketization Development of the Song Dynasty (960–1279) Textile Industry and Its Foreign Trade Dynamics

Shuaishuai Shi*, Feiya Ou, Yuefei Guo, Mengke Liu, Lu Yang, Zhikun Zhang, Bing Zuo

Shangqiu Institute of Technology, Shangqiu 476000, Henan, China

xfdshaui@163.com

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ABSTRACT

The textile industry of the Song Dynasty (960–1279) represents the pinnacle of pre-modern Chinese manufacturing and played a central role in the period's "economic revolution." This study adopts an interdisciplinary approach, integrating economic history, technological history, and global history to analyze how the internal marketization of this industry interacted synergistically with external trade dynamics to create a resilient, globally connected production and trade system. Through a critical analysis of diverse historical sources—including official records, archaeological materials, and foreign accounts—this paper revises previous assumptions regarding technological timelines and state-market relations. First, the production system underwent significant marketization, characterized by a shift from state dominance to a "state-supervised, privately-operated" workshop ("jihu") model, albeit one often constrained by coercive state procurement mechanisms, regional specialization, and the refinement of pattern-weaving technologies (precursors to the later documented drawloom), which enabled increased production of complex patterns. Second, foreign trade was driven by institutional support (the Maritime Trade Supervisorate system), multi-layered international demand (from East Asia to the Mediterranean), and evolving financial and logistical infrastructures (primarily bullion and ceramic exchange, with limited domestic currency circulation). Third, the port of Quanzhou served as a microcosm, demonstrating how local/regional production, foreign merchant communities ("fanfang"), and state regulation were integrated into an efficient export platform. The study concludes that the Song textile industry exemplifies a pre-modern, market-driven model of "Smithian growth," tempered by state intervention, where technological adaptation, institutional innovation, and integration into global networks converged to create a highly competitive and outward-oriented industrial complex, offering historical insights into the early globalization of "Made in China."

KEYWORDS

Song dynasty textile industry, marketization, hemai, drawloom technology, maritime trade

INTRODUCTION

The Song Dynasty is widely recognized as a period of profound socio-economic transformation in China, often termed the "Song economic revolution" [1–3]. This era witnessed unprecedented increases in agricultural productivity, the development of a monetary economy, urbanization, and the expansion of domestic and foreign commerce [4,5]. Against this backdrop of change, the textile industry was not only a cornerstone of the fiscal state—a crucial source of tax revenue in kind and currency—but also a dynamic engine of economic transformation and the primary commodity linking China to the burgeoning maritime trade networks of Asia [3].

Scholarship in this field has followed several paths. Foundational works in Chinese economic history, such as Qi Xia's *Songdai jingjishi* [6], established comprehensive institutional and macroeconomic frameworks. Li Bozhong's research on "early industrialization" in the Jiangnan region introduced valuable theoretical perspectives such as "Smithian growth" and "proto-industrialization" for analyzing long-term handicraft development [7,8]. Specialized studies in textile history and archaeology, particularly the work of Zhao Feng and his team [9,10], meticulously reconstructed the technical and artistic achievements of Song silk production through scientific analysis of excavated artifacts. Internationally, scholars like Shiba Yoshinobu [11] elucidated the complexities of Song domestic commercial networks, while others, such as Angela Schottenhammer [12], repositioned Song China within a globalizing "East Asian Mediterranean," emphasizing its dynamic maritime interactions.

Despite these contributions, a significant gap remains. Existing scholarship often treats the domains of production (technology, organization) and circulation/trade (institutions, routes) in relative isolation. There is still a need for a systematic analysis that explicitly links technological innovation and domestic marketization to the mechanisms of international expansion. How did advances in loom technology directly enable producers to meet diverse and volatile domestic and foreign market demands [13]? Conversely, how did signals and profits from overseas trade feedback into and stimulate adjustments in production organization and technology? Furthermore, existing narratives often overlook the dual nature of state intervention—both facilitating and coercive—and the geographical shifts in production following the loss of northern territories. This study aims to bridge these gaps by investigating the synergistic relationship between the internal marketization of the Song textile industry and the external drivers of foreign trade, while critically addressing methodological limitations in previous technological and economic reconstructions.

This paper seeks to answer two core research questions: (1) What were the specific structural manifestations and internal mechanisms of the marketization of the Song textile industry, including the tensions between state procurement and private enterprise? (2) What key dynamics drove Song textiles to transcend geographical limits and participate in international trade on a large scale and regular basis,

thereby shaping an early globalized industrial network? To this end, the paper first outlines its source base and methodology. It then presents integrated research findings and discussions, examining the market-oriented transformation of production and its core technologies, analyzing the composite mechanisms driving foreign trade, and providing a focused case study of Quanzhou port. Finally, it situates these findings within broader theoretical and comparative perspectives.

MATERIALS AND METHODS

Source Materials

Textual Sources: Official documents provide institutional and quantitative frameworks. The *Song Huiyao Jigao*, especially the sections on Finance and Economics (*Shihuo*) and Offices and Officials (*Zhiquan*), contains crucial data on taxation, state procurement (*hemai*), and Maritime Trade Supervisorate regulations [9]. Critical reading of these texts reveals not only regulatory frameworks but also records of grievances regarding forced procurement. Specifically, Song Huiyao Jigao: Shihuo 64/15-20 documents complaints about below-market pricing in hemai transactions, while Shihuo 70/10-15 records local magistrate memorials concerning procurement quotas that burdened weaving households [14]. Institutional compilations like the *Qingyuan Tiaofa Shilei* serve as supplements [15]. Private writings, such as Shen Kuo's *Dream Pool Essays* [16], Zhou Qufei's *Lingwai Daida* [12], and Zhao Rushi's *Zhufanzhi* [17], offer valuable, albeit scattered and personal, insights into technology, products, and overseas routes. Foreign accounts, including travelogues by Arab merchants like Sulayman and Ibn Battuta, as well as Korean and Japanese documents, provide external validation for the international circulation and reputation of Song textiles [14,18]. To address comparative claims, this study also incorporates available English translations of primary sources regarding Byzantine guild regulations (e.g., Book of the Eparch) and Islamic tiraz inscriptions to ensure a balanced typological analysis [19].

Archaeological and Material Evidence: This constitutes the most direct evidence for technology and trade. Exquisitely preserved silk garments excavated from Southern Song tombs (e.g., the Huang Sheng Tomb in Fuzhou, the Zhou Yu Tomb in Jintan) allow for precise analysis of fabric structure, patterns, and dyeing techniques, providing material evidence for assessing technical levels [17]. Marine archaeology has been transformative: shipwrecks like the Quanzhou ship (c. 1277) and the "Nanhai I" (early 13th century) provide tangible evidence of trade practices [20]. While organic textiles have largely degraded in marine environments, traces of silk fibers, associated artifacts (coins, ceramics), and recent proteomic analysis of silk fibroin residues on metal objects from the "Nanhai I" collectively confirm the presence of textiles as cargo. However, quantitative assertions regarding volume are derived cautiously, correlating residue density with stowage patterns rather than assuming parity with ceramic loads [21].

Visual Sources: Later copies of the Southern Song Pictures of Tilling and Weaving and tomb murals depicting weaving scenes provide visual references for tools and workshop settings. Crucially, reconstructions of loom technology rely on a cross-referencing of Song-era textual descriptions with Yuan Dynasty illustrations (e.g., Wang Zhen's Nong Shu), explicitly acknowledging the temporal gap and treating the latter as indicative of evolving traditions rather than exact contemporary snapshots [22].

Research Methods

The analysis is conducted through the following interrelated specific methods:

(1) Critical Contextual Analysis of Texts and Institutions: Chronological collation and comparative analysis of relevant records in texts like the *Song Huiyao Jigao* are performed to trace the semantic evolution of key terms such as *hemai* and *jihu*. Special attention is paid to memorials complaining about underpayment and forced quotas to capture the coercive dimensions of state procurement, particularly those recorded in Shihuo 64 and 70. Intertextual reading of institutional statutes with private notes like *Mengliang Lu* is used to reconstruct the socio-economic context of policy implementation.

(2) "From Object to People" Analysis of Material Technology: Scientific examination data from archaeological reports (e.g., *Fuzhou Nansong Huang Sheng Mu*) on silk fabric weave structure, pattern repeat units, and warp/weft density are integrated [23]. These quantitative data are compared and logically deduced alongside images from the *Pictures of Tilling and Weaving* and cautiously extrapolated from later Yuan dynasty technical illustrations to reconstruct pattern-weaving efficiency and its impact on product complexity and mass-production capability, thereby connecting technical features to market demand. The limitations of projecting 14th-century mechanical details onto 12th-century practices are explicitly discussed.

(3) Spatial Reconstruction of Trade Networks: A Historical Geographic Information System (HGIS) method is applied. Spatial nodes are entered based on textile tribute locations recorded in the *Yuanfeng Jiuyu Zhi* (covering both Northern and Southern Song periods where data permits), trading ports noted in the *Zhufanzhi*, and key archaeological sites (shipwreck locations, Fustat). Major land and maritime trade routes are simulated based on Song navigation records (e.g., *Lingwai Daida*) and monsoon patterns. By calculating node centrality and route density, core production areas, hub ports, and main trade corridors are identified, ultimately generating Figure 1. The map distinguishes between Northern Song production centers lost to the Jin and the subsequent southern relocation of industries.

Figure 1. Map of major textile production regions and overseas trade routes in Song China. The map delineates core production zones for luxury silks, plain silks, hemp, and early cotton, differentiating between Northern Song (pre-1127) and Southern Song (post-1127) centers, and illustrates key domestic commodity flows and international maritime routes connecting China to markets across East and Southeast Asia, the Indian Ocean, and beyond. Key archaeological sites, such as shipwrecks and overseas find-spots, are also marked. (Base map and administrative divisions from Tan Qixiang's Historical Atlas of China: Song, Liao, and Jin Period; production information synthesized from Yuanfeng Jiuyu Zhi, Songshi: Shihuozhi, Mengliang Lu, and Wujunzhi; trade routes and ports based on Lingwai Daida, Zhufanzhi, and studies on trade networks; archaeological sites from relevant excavation reports.)

(4) Typological Construction through Cross-Civilizational Comparison: Two dimensions—"production organization" and "trade network"—are selected to structurally compare the Song model with contemporaneous production modes in the Islamic world (tiraz workshops) and Byzantium (guilds), and with trade models like the Trans-Saharan trade and the Hanseatic League, controlling for variables. This comparison utilizes available English translations of primary legal codes and administrative records from Byzantine and Islamic sources, supplemented by secondary scholarship, to ground the analysis in empirical data rather than generalizations. A typological table is constructed by extracting key characteristics of each in terms of property rights structure, market access, capital mobility, and state role, to explain the institutional roots of systemic vitality differences.

RESULTS AND DISCUSSION

The Marketization of Production and Its Technological Engine

Contextual analysis based on texts indicates that the Song textile industry underwent a decisive shift from the state-dominated model of the Tang Dynasty towards a "state-supervised, privately-operated" system. A

core institutional innovation was the widespread use of hemai (contract purchase by the state). Analysis of data from the Song Huiyao Jigao (Shihuo) shows that by the Southern Song, the proportion of silk and cloth for imperial supply obtained through hemai in southeastern regions far surpassed that from official workshops [3,9]. This shift meant the state transformed from a producer into the largest centralized purchaser, systematically channeling massive government demand into the market and incentivizing private production.

However, it is critical to nuance the characterization of hemai as purely market-driven. Historical records frequently document instances where hemai functioned as a form of coerced levy, with officials imposing unrealistic quotas or paying below-market rates, effectively burdening jihu households. Song Huiyao Jigao: Shihuo 64/15-20 records specific complaints from Zhejiang households about procurement prices set at 30-40% below market value, while Shihuo 70/10-15 contains memorials from Fujian magistrates requesting relief from excessive quotas [14]. Thus, while the mechanism utilized market channels, it was often underpinned by state compulsion, suggesting a hybrid model of "administered marketization" rather than a purely free-market "Smithian" expansion.

Within this environment, professional jihu (weaving households) emerged in urban centers like Suzhou and Hangzhou, while the rural household production of "men till, women weave" became deeply commercialized. Together, they constituted a vast and flexible production base. Our spatial analysis (see Figure 1) further reveals a geographically restructured landscape driven by both market forces and geopolitical necessity. Following the loss of northern territories to the Jin Dynasty in 1127, the textile production landscape shifted dramatically. While the Northern Song had relied heavily on Hebei and Jingdong for plain silks (juan), the Southern Song period saw an intensification of production in the Liangzhe Circuit and the rapid development of Fujian and Guangdong regions to compensate for lost capacity [24]. By geolocating records of products and tribute, highly specialized industrial clusters are identified: Liangzhe Circuit focused on high-value-added gauzes (luo) and damasks (ling); Sichuan relied on its historic brand to produce luxurious Shu brocades; and the emerging southern coastal regions expanded ramie and early cotton production. This regional division of labor (its categories and market characteristics summarized in Table 1) linked raw materials, production, and sales through merchant networks, forming a resilient national supply chain that laid the foundation for outward expansion.

Table 1: Major types of Song Dynasty textiles, their production regions, and primary export markets. (Synthesized from Songshi: Dilizhi, Yuanfeng Jiuyu Zhi, Mengliang Lu, Wujunzhi, Lingwai Daida, Zhufanzhi, and modern economic history studies.)

Textile Type	Main Production Regions	Key Characteristics/Technique	Main Export Markets	Key Evidence
Brocade	Sichuan	Colorful, complex patterns,	Goryeo,	*Shujin Pu*; Goryeo records.

Textile Type	Main Production Regions	Key Characteristics/Technique	Main Export Markets	Key Evidence
(Jin)	(Chengdufu Lu)	often with gold thread.	Japan, Imperial gifts.	
Gauze (Luo)	Liangzhe Lu (Yuezhou, Huzhou)	Lightweight, porous, with complex damask patterns.	Japan, Southeast Asian elites.	*Jiatai Huiji Zhi*; Huang Sheng tomb finds.
Damask (Ling)	Liangzhe Lu, Jingdong Lu (North) / Liangzhe (South)	Twill ground with patterned weave, soft luster.	Goryeo, Japan, Southeast Asia.	*Yuanfeng Jiuyu Zhi* tributes; *Zhufanzhi*.
Plain Silk (Juan)	Hebei, Jingdong Lu (North; declined post-1127) / Liangzhe (South; expanded)	Dense texture, bulk commodity.	Widespread export, also used as currency.	*Songshi: Shihuozhi*; *Zhufanzhi* records of silk-for-goods exchange.
Ramie Cloth (Zhubu)	Fujian, Guangxi Lu	Light, breathable, suitable for hot climates.	Southeast Asia, Indian Ocean region.	*Lingwai Daida*; *Zhufanzhi* records on plant-fiber cloths.
Cotton Cloth (Jibeibu)	Guangdong, Fujian Lu	Nascent industry, soft and warm.	Various Southeast Asian polities.	*Zhufanzhi* entry on *Jibei*.

Technological innovation was the core engine of this market-driven system. Through inferential analysis of material technology, the most revolutionary advancement was the refinement and widespread adoption of complex pattern-weaving looms, likely precursors to the fully developed drawloom (shuzong tihua ji)

documented in later periods (structural reconstruction shown in Figure 2) [25]. It must be noted that the detailed mechanical reconstruction presented in Figure 2 relies heavily on Wang Zhen's Nong Shu (1313) and later copies of Song paintings. While the intricate patterns found in Song textiles (e.g., Huang Sheng Tomb) necessitate a mechanism capable of managing hundreds of sheds—functionally equivalent to a drawloom—the exact configuration of the Song-era machine remains inferred. The term "drawloom" is used here to describe this functional capability, acknowledging that the specific "pattern chain" (huaben) mechanism may have evolved gradually between the 12th and 14th centuries. Material evidence is conclusive: textiles excavated from the Huang Sheng Tomb, such as the "ribbon and peony pattern gauze" (photo and structure shown in Figure 3), exhibit extreme regularity and complexity in pattern repeats that would be impossible without advanced pattern-control weaving technologies [6,26]. This technological leap meant that producers could, for the first time, respond to domestic and foreign high-end market demands for novel, complex patterns with predictable efficiency and precision in batch production. It accelerated design iteration and enabled product differentiation, serving as the key technical node converting market demand directly into supply-side capability. The standardization of dyeing and finishing techniques (large-scale use of plant dyes) further enhanced the product's color value and market appeal.

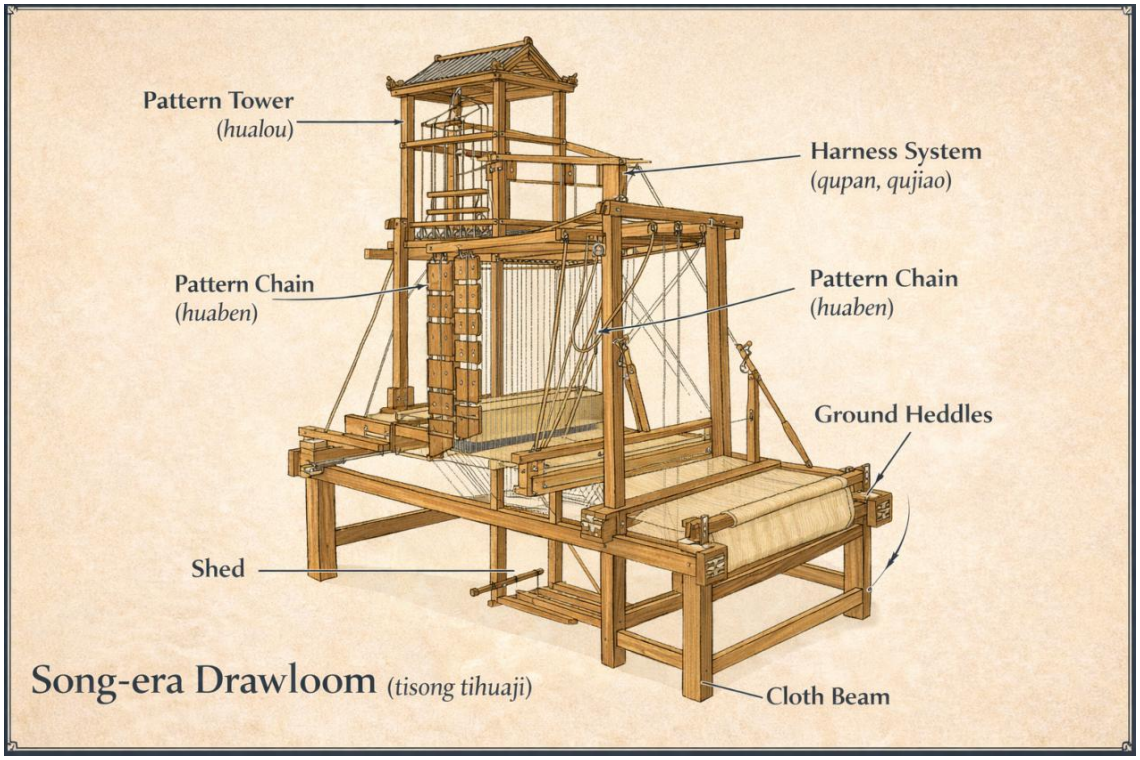

Figure 2. Reconstruction diagram of a Song-era pattern-weaving loom (based on later Yuan Dynasty documentation). The illustration labels key components such as the pattern tower (hualou), the harness system (qupan, qujiao), the pattern chain (huaben), ground heddles, the shed, and the cloth beam, explaining its "programmable" patterning mechanism. Note: This reconstruction synthesizes Song textile artifacts with the detailed mechanical drawings from Wang Zhen's Nong Shu (1313). While functionally representative of the technology required to produce Song silks, specific mechanical details may reflect 14th-century refinements. (Reconstruction based on later documentary and pictorial sources, including Wang Zhen's Nong Shu (Yuan Dynasty),

later copies of the Song Gengzhi Tu, and modern scholarly reconstructions by historians of Chinese technology.)

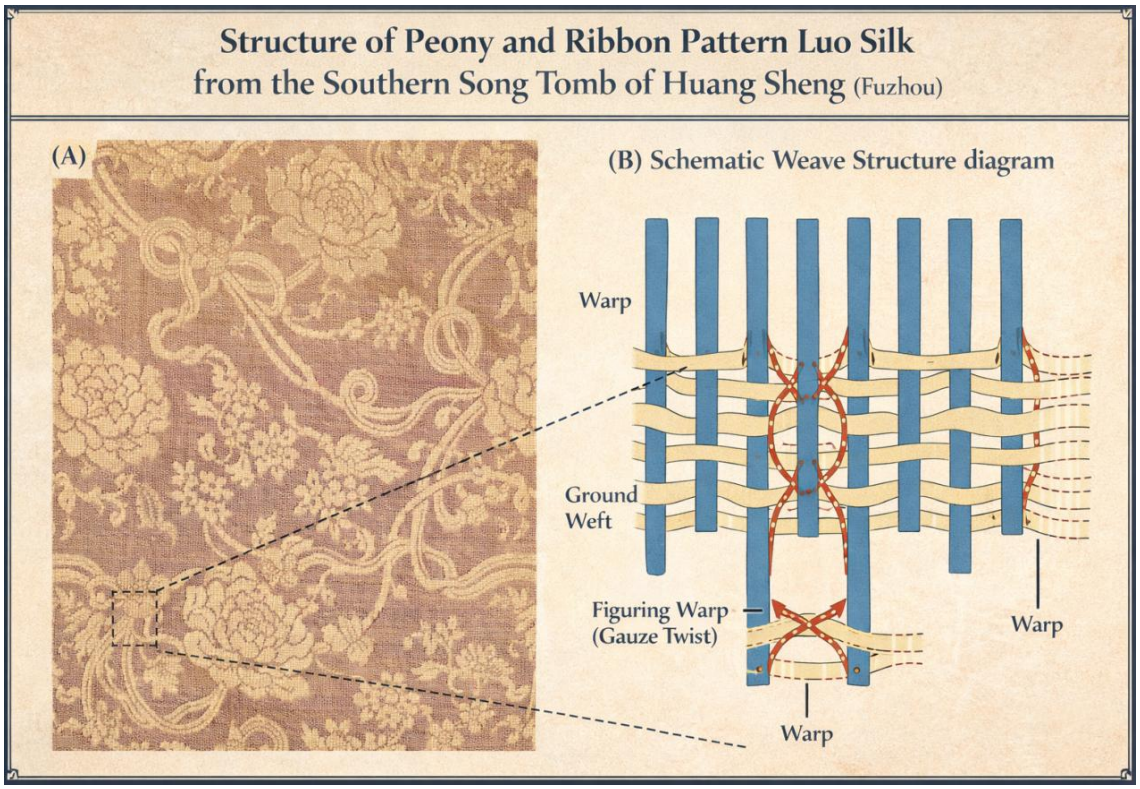

Figure 3. (A) Photograph and (B) schematic weave structure diagram of the "Peony and Ribbon Pattern Luo" silk excavated from the Southern Song Tomb of Huang Sheng (Fuzhou). The image shows the intricate pattern and delicate texture of the fabric, while the diagram elucidates the complex interaction of warp, ground weft, and figuring warp (or gauze twist) that characterizes this advanced luo weave, made possible by advanced pattern-weaving technology. (Photograph and pattern description directly from the archaeological report Fuzhou Nan Song Huang Sheng Mu (1982); weave structure analysis referenced from Zhao Feng's A History of Chinese Silk Art (2005).)

The Compound Driving Mechanism of Foreign Trade

The large-scale export of Song textiles was not accidental but resulted from a convergence of institutional guarantees, market demand, and logistical support, with trade activities closely aligned with the network illustrated in Figure 1. At the institutional level, the state played a crucial enabling role by establishing a commercially oriented foreign trade management system centered on the Maritime Trade Supervisorates (shibosi) (see Table 2). Through mechanisms such as duty collection (choujie), official procurement (bomai), and the issuance of trading permits, this system effectively reduced transactional uncertainty while providing a stable regulatory framework for maritime commerce. At the same time, the tribute-bestowal trade functioned as a form of state-led export of high-end luxury goods, demonstrating superior craftsmanship and directly stimulating the production of premium textiles.

Table 2. Establishment and primary functions of the Song Dynasty Maritime Trade Supervisorates (Shibosi). (Based primarily on the detailed records in Song Huiyao Jigao: Zhiguan 44, supplemented by Songshi: Shihuozhi and local gazetteers.)

Location	Year Established (Northern Song)	Key Functions	Jurisdiction/Primary Trade Areas	Documentary Source
Guangzhou	Kaibao 4th Year (971)	First established. Managed South Sea trade: levy duties (choujie), purchase goods (bomai), issue trading permits (gongping).	Southeast Asia, Indian Ocean, Arab regions.	*Song Huiyao Jigao: Zhiguan 44*
Hangzhou	Duangong 2nd Year (989)	Managed merchants from Liangzhe Lu; later moved to Mingzhou.	Japan, Goryeo, Southeast Asia.	*Songshi: Shihuozhi*
Mingzhou	Chunhua 3rd Year (992)	Became the main port for trade with Japan and Goryeo.	Japan, Goryeo.	*Baoqing Siming Zhi*
Quanzhou	Yuanyou 2nd Year (1087)	The most important foreign tr ade port in Southern Song, "the profits from maritime trade were greatest here."	All Asian sea routes, especially Southeast Asia and Indian Ocean.	*Song Huiyao Jigao: Zhiguan 44; Quanzhou Fuzhi*

At the level of international demand, Song textiles successfully met the multi-layered market needs of the Asian maritime world: Goryeo Korea and Japan imported high-grade damasks, brocades, and gauzes for aristocratic attire and religious purposes [14]; Southeast Asian regions favored colored "tie-dyed silks" (xiejuan) and lightweight ramie cloth [12,13]; demand even reached the Islamic world, attested by Song silk fragments unearthed at Fustat, Egypt [27]. In some Southeast Asian markets, standardized silk bolts also functioned as commodity currency, deeply embedded in local economic systems [13]. The "Nanhai I" shipwreck archaeology provides significant physical evidence for the scale and nature of this trade. Its massive quantities of ceramics, co-occurring silk traces [28], and large amounts of copper coins constitute a "micro-economy," not only confirming the pillar export model of "ceramics and silk sharing the same ship" [17]. However, it is important to qualify the volume of textile exports: while proteomic analysis confirms the presence of silk fibroin residues on metal artifacts and in sediment layers, the complete degradation of organic textiles prevents a direct volumetric comparison with the intact ceramic cargo. The assertion of "massive quantities" is thus inferred from the high value-density of silk, its prominence in textual trade records, and the strategic placement of residues in storage holds, rather than direct archaeological counting. Its cargo mix—luxury goods alongside bulk commodities, supplemented by diverse transaction

media—further reveals the mature commercial strategy of Song maritime merchants to adapt to complex overseas markets through product diversification and flexible payment methods.

At the logistical and financial support level, the facilitation of trade relied primarily on the flow of bullion (gold, silver) and barter exchanges (ceramics for spices), rather than domestic paper currency. Contrary to earlier assumptions, Song paper currency (jiaoxi, huizi) was largely restricted to domestic circulation and specific border markets; there is scant evidence to suggest it was used directly in transoceanic transactions with Arab or Southeast Asian merchants, who preferred hard currency or commodity exchange [29]. Instead, the rise of specialized port hubs, epitomized by Quanzhou, provided crucial physical infrastructure. Quanzhou, with its deep-water harbor, warehousing facilities, navigation lighthouses, and dense shipping networks, efficiently connected China's production hinterland with destination markets in Southeast and South Asia, completing the full-chain support from production to consumption. In summary, the institutionalized management framework provided a stable foundation for trade, multi-tiered overseas demand created the fundamental driving force, and robust commodity-based exchange systems and port logistics solved the key technical challenges of large-scale transoceanic transactions. These three elements, coupled together, transformed the production capacity of the Song textile industry into a powerful competitive advantage in the global market.

A Microcosm of the System: The Integrated Network of Quanzhou Port

Quanzhou port (see the network shown in Figure 4) serves as an ideal micro-case of the synergistic action of the aforementioned dynamics. It was far more than a simple transit point; it was a networked ecosystem. Locally, it relied on the Fujian hinterland to produce ramie cloth and early cotton cloth suitable for tropical markets [13]. Regionally, it aggregated and processed silks from northern Fujian ("Jianning brocade") and Zhejiang. Its large, settled foreign merchant community (fanfang), comprising Arab, Persian, Indian, and Southeast Asian traders, was crucial [29]. They served as channels for market information, provided commercial credit, and likely initiated "customized production" based on overseas preferences, thereby directly linking production and consumption.

Archaeology strengthens this model. The mixed cargo of spices and textiles on the Quanzhou shipwreck corroborates textual records. The discovery of multilingual religious stone inscriptions locally confirms the existence of a multicultural community. Notably, the reprocessing of exported silks at their destinations (e.g., Arabic inscriptions embroidered onto Song fragments found at Fustat) [30] illustrates cross-cultural dialogue and value addition within the global trade network. While direct evidence of this aesthetic feedback loop influencing specific design changes in Chinese production centers remains circumstantial, the presence of such adapted goods suggests a dynamic interaction where consumer preferences in distant markets were acknowledged, if not always immediately reflected in surviving Chinese artifacts.

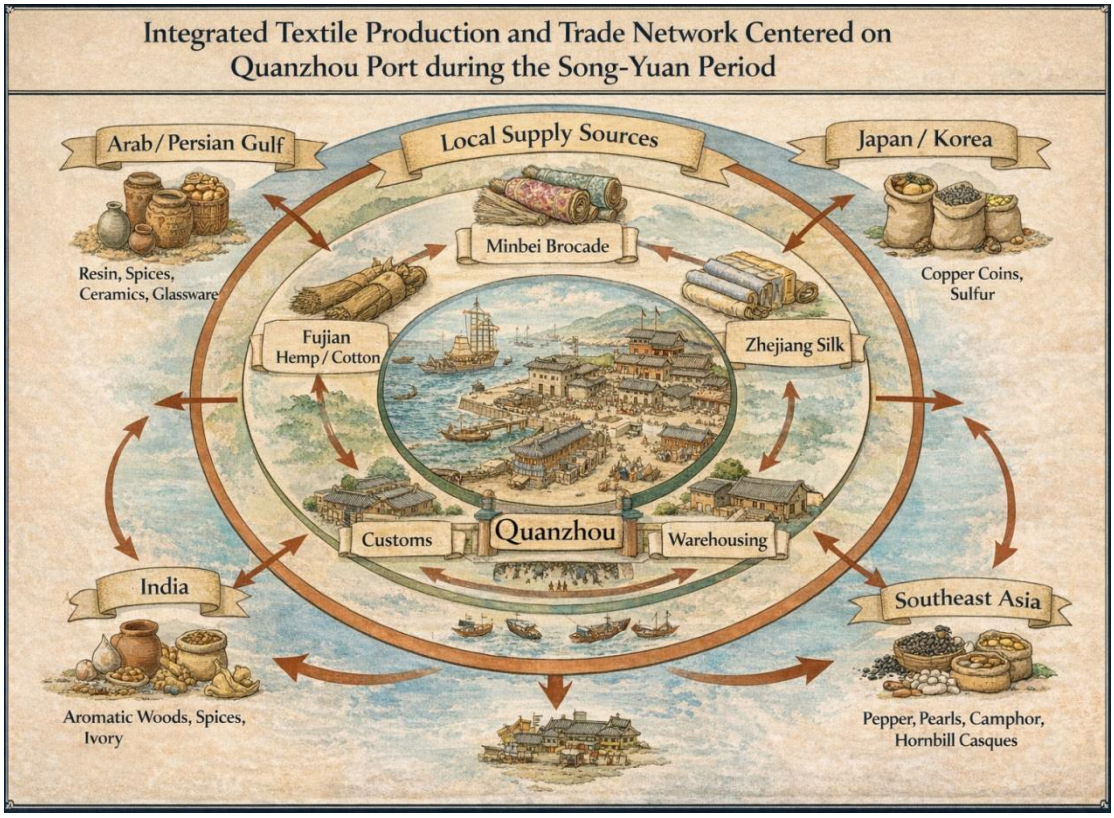

Figure 4. Schematic illustration of the integrated textile production and trade network centered on Quanzhou Port during the Song-Yuan period. The diagram conceptualizes Quanzhou's role through three concentric layers: the inner ring showing local and regional supply sources (Fujian hemp/cotton, Minbei brocade, Zhejiang silk); the central ring depicting the port's infrastructure and functions (customs, foreign quarter, warehousing, processing); and the outer ring illustrating its primary overseas trade connections and associated commodity flows. This figure represents a conceptual synthesis of trade flows based on textual records and archaeological distribution, rather than a literal reconstruction of specific commercial transactions. (Synthesized from local gazetteer records (Fangyu Shenglan, Quanzhou Fuzhi), official documents (Song Huiyao Jigao), trade records (Lingwai Daida, Zhufanzhi, Daoyi Zhilüe), and archaeological evidence of the foreign community.)

A "Market-Technology-Institution" Synergy Model and Its Theoretical Implications

Synthesizing the above evidence, we propose a "market-technology-institution" synergistic model explaining the success of the Song textile industry. Internally, marketization (state-private production, regional division of labor) and key technologies like advanced pattern-weaving looms together built an efficient and responsive supply system. Externally, compound trade dynamics (Maritime Trade Supervisorate system, global demand, commodity-based finance, and logistics) provided stable and profitable export channels. These elements mutually reinforced each other, forming a virtuous cycle: the market drove production, while trade profits and information fed back into production optimization. The Quanzhou case centrally embodies this synergy.

This model prompts deeper theoretical reflection. First, it engages in a tension-filled dialogue with "proto-industrialization" theory [5]. The case study exhibits characteristics like commodity production for distant markets and the involvement of rural households. However, the key divergence lies in the driving

forces and social consequences. Song's expansion was deeply embedded in an active domestic market, flexible household economic units, and state market participation via hemai (which included both incentivizing purchases and coercive levies), and did not trigger social structural upheavals akin to Europe. This suggests that similar economic phenomena can be rooted in vastly different institutional soils. Therefore, defining it as a form of "highly developed Smithian growth" might be more precise [5,31], provided one acknowledges the significant role of state coercion alongside market mechanisms. Its growth core indeed lay in the deepening of the division of labor and the expansion of the market scope. This study's contribution lies in revealing how the exceptional efficacy of this Smithian dynamic was enabled by technological innovations like pattern-weaving looms and safeguarded and accelerated by institutional innovations like the Maritime Trade Supervisorates.

Through brief typological comparison, the uniqueness of this system is highlighted. Drawing on available English translations of primary source analyses of Byzantine guild regulations (e.g., Book of the Eparch) and Islamic tiraz administration, the Song jihu system appears more market-responsive compared to the guild exclusivity of Byzantium or the politically oriented tiraz workshops of the Islamic world [32]. Compared to the political monopolies of the Hanseatic League or the geographical constraints of the Trans-Saharan trade, the Song maritime network, managed by the Maritime Trade Supervisorates and operated by diverse merchant groups, exhibited greater openness, competitiveness, and adaptability [33]. This openness was key to its successful integration into early globalization.

From a broader historical perspective, the overseas circulation of Song dynasty textiles can be viewed as a precursor to later extensive Eurasian trade networks. While avoiding anachronistic geopolitical terminology, the structural parallels are evident: the integration of specialized regional production clusters, the reliance on key port hubs as platforms for logistics and information exchange, and the role of institutional coordination in reducing transaction costs across long-distance trade. The Song experience demonstrates that the global competitiveness of textile industries did not rely solely on resource endowment, but rather on the synergistic interaction between technological scalability, market-oriented production organization, and openness to external demand. In this sense, the historical trajectory of Song textiles provides a long-term reference for understanding the evolution of global value chains in the textile sector. It suggests that sustainable integration into global value chains requires not only infrastructural connectivity, but also continuous process innovation, product adaptability to diverse markets, and institutional mechanisms capable of balancing state regulation with market flexibility.

CONCLUSION

This study demonstrates through systematic analysis that the global achievements of the Song textile industry stemmed from a deeply interconnected, internally and externally synergistic composite system.

Internally, the industry forged powerful, flexible, and rapidly market-responsive supply capabilities through profound marketization reforms (manifested in the "state-supervised, privately-operated" production structure and regional specialization) and breakthrough technological adaptation (especially the widespread adoption of advanced pattern-weaving looms). Externally, its successful integration into global networks benefited from a unique combination: effective institutional planning and guarantee (the Maritime Trade Supervisorate-centered management system), multi-layered and robust overseas market demand, and corresponding innovations in commodity-based exchange systems and maritime logistical infrastructure. The microcosmic case of Quanzhou port vividly shows how these elements fused at a specific geographical node to form a dynamic and resilient network integrating production clusters, transoceanic trade, and cross-cultural exchange. This system not only propelled the Song textile industry to the forefront of pre-modern global manufacturing but also laid a profound foundation for the outward-oriented economic development of later Chinese periods.

From a theoretical perspective, the trajectory of the Song textile industry represents a highly successful, market-driven path of "Smithian" growth, tempered by the realities of state coercion and geopolitical shifts. It indicates that, even in the absence of an energy revolution, by maximizing the division of labor, unprecedentedly expanding the market scope, and with the support of key technological empowerment and adaptive institutional frameworks, an economy could reach peak pre-industrial levels of production efficiency and commercial expansion within the context of early globalization. The key historical insight for the present is this: for any industry or craft to attain enduring vitality, its foundation lies in the continuous innovation of its technological core, effective connection with market demand, and the proactive integration into and shaping of more open networks and institutional environments—all three must advance synergistically.

Author Contributions

Shuaishuai Shi conceived and designed the study, developed the research framework, and drafted the manuscript.

Feiya Ou contributed to the theoretical construction and methodological design.

Yuefei Guo and Mengke Liu collected and organized historical sources and participated in data analysis.

Lu Yang assisted in literature review and interpretation of archaeological materials.

Zhikun Zhang contributed to the spatial analysis and visualization of trade networks.

Bing Zuo participated in manuscript revision and provided critical academic feedback.

All authors have read and approved the final version of the manuscript.

Conflicts of Interest

The author declares no conflict of interest.

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