

The Application of Intelligent Finance and Taxation in the Textile Industry Supply Chain

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ABSTRACT With the rapid advancement of industrial Internet technologies and intelligent wireless sensing infrastructures, efficient data acquisition and information transmission have become fundamental to modern textile supply chain management. The integration of electromagnetic-enabled Internet of Things (IoT) devices, RFID technologies, and intelligent communication networks provides essential support for real-time financial monitoring and digital taxation services. Against this background, this paper investigates the application of intelligent finance and taxation in textile industry supply chains by proposing an integrated framework based on artificial intelligence, blockchain, cloud computing, and IoT technologies. The framework enables transparent financial management, automated tax compliance, dynamic supply chain finance, and end-to-end traceability through seamless integration of operational, financial, and logistics data. Key applications, including blockchain-based material provenance verification, AI-driven credit assessment, automated customs and tax processing, and intelligent risk management, are systematically analyzed. The proposed architecture improves supply chain transparency, operational efficiency, sustainability, and resilience while facilitating data-driven decision-making across textile production and distribution processes. Furthermore, the study demonstrates that intelligent finance and taxation can establish a unified digital ecosystem for financial governance and supply chain collaboration, providing valuable technical references for wireless industrial information acquisition, smart sensing, and communication-assisted digital management in future intelligent manufacturing environments.

INDEX TERMS intelligent finance, blockchain, textile supply chain, industrial internet, wireless sensing

I. INTRODUCTION

THE textile industry has long been a cornerstone of the global economy, weaving together a complex web of stakeholders from raw material producers to end consumers [1,2]. However, its supply chain is notoriously intricate and fraught with challenges. Characterized by long lead times, high levels of fragmentation, intense cost pressures, and increasing consumer demand for sustainability and transparency, the traditional textile supply chain struggles with inefficiencies, financial opacity, and significant compliance burdens [3,4]. The flow of goods is often disconnected from the flow of information and capital, leading to delayed payments, increased working capital requirements for smaller suppliers, and difficulties in managing financial and operational risks [5]. Furthermore, the global nature of the industry, with production, manufacturing, and sales occurring across multiple jurisdictions, creates a labyrinth of tax regulations and customs duties that are difficult to navigate, costly to manage, and prone to errors [6,7].

In response to these enduring challenges, the wave of digital transformation, often termed Industry 4.0, offers a

powerful suite of solutions. Within this wave, the domain of intelligent finance and taxation—leveraging technologies like artificial intelligence (AI), machine learning (ML), blockchain, the Internet of Things (IoT), and big data analytics—is emerging as a critical enabler of change. In this context, the term, "intelligent" signifies a critical evolution from traditional automation to systems that can learn, adapt, and make autonomous decisions [8–10]. Intelligent finance, for example, moves beyond simply digitizing payments. Its intelligence lies in its capacity to learn from real-time operational data. A dynamic credit-scoring model, for instance, continuously adapts a supplier's risk profile based on their live performance (e.g., on-time delivery rates, quality metrics) and can autonomously execute financing decisions based on these evolving scores. Similarly, intelligent taxation transcends standard automated compliance. An "intelligent" system can proactively adapt to changes in international tax law and use predictive analytics to model various sourcing scenarios. It can then autonomously recommend the most tax-efficient, compliant routing for goods—a decision-making capability that goes far beyond

simple calculations. The convergence of these intelligent systems with supply chain management holds the potential to fundamentally reengineer the financial and administrative backbone of the textile industry [11,12].

This paper aims to provide a comprehensive analysis of the application of intelligent finance and taxation within the specific context of textile industry supply chain management. It seeks to move beyond a high-level overview of technologies to explore the specific mechanisms, benefits, and strategic implications of their integration. The central thesis is that by creating a seamless, transparent, and intelligent flow of data, finance, and tax information that mirrors the physical flow of goods, textile companies can unlock significant value, enhance competitiveness, and build more resilient and ethical supply chains. The study will present a conceptual framework for this integration, analyze key application areas in detail, and discuss both the transformative opportunities and the pragmatic challenges involved. Ultimately, this article will argue that embracing intelligent finance and taxation is no longer a futuristic vision but an impending strategic imperative for survival and leadership in the evolving global textile landscape.

II. LITERATURE REVIEW

The body of academic and industry literature provides a solid foundation for understanding the components of this research area, though a holistic synthesis remains a key research gap. The literature can be broadly categorized into three streams: traditional textile supply chain management, the rise of Industry 4.0 technologies, and the evolution of financial and tax technologies (FinTech and TaxTech). First, the literature on textile supply chain management has extensively documented its inherent complexities. Scholars have focused on issues such as the bullwhip effect, long and variable lead times, and the challenges of coordinating a fragmented network of suppliers, manufacturers, and distributors [13,14]. Many studies have highlighted the power imbalances within the chain, where large retailers and brands often impose extended payment terms on smaller and medium-sized enterprises (SMEs), leading to significant working capital constraints and financial instability for these crucial suppliers [5,15]. Furthermore, research has increasingly focused on the demand for sustainability and traceability, driven by consumer and regulatory pressures [16,17]. The lack of transparency in conventional supply chains makes it difficult to verify claims related to organic materials, fair labor practices, or environmental impact, creating both reputational and financial risks.

Second, a vast and growing body of work explores the impact of Industry 4.0 technologies on manufacturing and supply chain management. The roles of IoT for real-time tracking of goods, big data analytics for demand forecasting, and AI for process optimization are well-established in a general sense [18]. Specifically, within the textile context, research has explored the use of radio-frequency identification (RFID) and IoT for inventory management and

logistics tracking. AI applications in textile manufacturing, such as automated quality control using computer vision and predictive maintenance for machinery, have also been investigated. The potential of blockchain technology to enhance traceability and transparency has been a particularly active area of research, with many conceptual papers proposing its use to track the provenance of raw materials like cotton from farm to garment, thereby combating counterfeiting and validating sustainability claims [19,20].

The third stream of literature covers the disruptive impact of FinTech and TaxTech. FinTech research has detailed the rise of alternative lending platforms, digital payment systems, and data-driven credit-scoring models. A significant sub-field is supply chain finance (SCF), which explores mechanisms to optimize cash flow within a supply chain. Traditional SCF models, however, are often limited to the first-tier suppliers of large corporations. The literature suggests that technology-enabled SCF, using real-time data from the supply chain, can extend financing deeper into the supply chain network, reaching smaller suppliers who need it most [21]. In parallel, TaxTech literature describes the shift from reactive, manual tax processes to proactive, automated compliance systems. These systems can integrate with a company's enterprise resource planning (ERP) to automate the calculation and reporting of value-added tax (VAT), customs duties, and other transaction-based taxes, reducing errors and administrative costs.

Despite the rich literature in these individual areas, a significant research gap exists at their intersection. While the application of blockchain for textile traceability is widely discussed, the direct linkage of this traceability to automated financial settlements and real-time tax calculations is less explored. Similarly, while AI in supply chain forecasting is a common topic, its use in dynamically assessing the financial health of textile suppliers for adaptive financing is an emerging concept. There is a clear need for a holistic framework that integrates intelligent finance and taxation not as separate add-ons, but as core components of a digitized textile supply chain management system. This paper aims to address this gap by proposing such a framework and analyzing its practical applications and strategic implications for the textile industry.

III. A FRAMEWORK FOR INTELLIGENT FINANCE AND TAXATION IN THE TEXTILE SUPPLY CHAIN

To systematically harness the benefits of intelligent finance and taxation, a structured and integrated framework is necessary. This framework should not be viewed as a single software solution but as a conceptual architecture that guides the integration of various technologies and processes across the supply chain. We propose a multi-layered framework designed to create a data-driven, intelligent, and responsive ecosystem that aligns financial and tax operations with physical logistics and production. The relationship between these layers is illustrated in Figure 1. The framework distinguishes between processed insights, which are the

direct outputs of analytical algorithms (e.g., AI-generated predictions and scores), and aggregated KPIs, which are the curated, business-level management indicators used for reporting and monitoring (e.g., compliance and working capital status). This flow of information, from raw data to strategic intelligence, is detailed in the following sections.

A. LAYER 1: THE DATA ACQUISITION AND CONNECTIVITY LAYER

This foundational layer is responsible for capturing real-time data from every stage of the supply chain. It is the sensory network of the intelligent supply chain. Key technologies include:

- **Internet of Things (IoT):** RFID tags, GPS trackers, and embedded sensors are attached to raw materials (e.g., cotton bales), semi-finished goods (e.g., fabric rolls), and finished garments. These sensors capture data on location, temperature, humidity, and handling, providing a real-time digital representation of the physical supply chain.
- **Enterprise resource planning (ERP) Integration:** APIs (Application Programming Interfaces) connect the core ERP systems of all major supply chain partners—suppliers, manufacturers, logistics providers, and brands. This allows for the seamless exchange of critical business documents such as purchase orders, advance shipping notices, invoices, and production status updates.
- **Third-party data streams:** Integration with external data sources provides crucial context. This includes data from financial markets (exchange rates, interest rates), logistics providers (shipping schedules, delays), customs authorities (tariff rates), and even unstructured data from news and social media (for sentiment analysis and geopolitical risk assessment).

B. LAYER 2: THE TECHNOLOGY AND ANALYTICS ENGINE LAYER

This middle layer processes, analyzes, and secures the vast amount of data collected by the first layer. It is the brain of the system, transforming raw data into actionable intelligence.

- **Cloud computing platform:** A scalable cloud infrastructure is essential for storing and processing the massive datasets generated by the supply chain. It provides the computational power needed for complex analytics and ensures data accessibility for all permissioned stakeholders.
- **Blockchain/Distributed ledger technology (DLT):** A permissioned blockchain serves as the immutable "golden record" for the supply chain. Key events—such as the certification of organic cotton, the completion of a manufacturing stage, the quality control approval, or the shipment of goods—are recorded as transactions on the blockchain. This creates an unchangeable, auditable

trail, ensuring data integrity and transparency for all participants.

- **Artificial intelligence (AI) and machine learning (ML) engine:** This engine runs various algorithms on the integrated data. Its functions include :

Predictive analytics forecasts demand, identifies potential production delays, and predicts logistics bottlenecks. *Credit scoring* dynamically assesses the creditworthiness of suppliers based on their real-time performance data (e.g., on-time delivery rates, quality metrics) rather than just historical financial statements. *Fraud detection* identifies anomalies in transactions and documents to prevent fraudulent activities. *Optimization* recommends optimal shipping routes, inventory levels, and production schedules. Implementing these functions requires careful consideration of model selection and governance. For instance, a dynamic credit-scoring could be developed using gradient-boosting models (e.g., XGBoost) trained on validated historical and real-time performance data from the platform. However, building such models presents significant challenges. It is crucial to address potential data bias to ensure the algorithms do not unfairly penalize smaller suppliers. Furthermore, for high-stakes decisions, model interpretability is paramount. The framework must incorporate explainable AI (XAI) techniques (e.g., SHAP or LIME) to ensure that every automated decision, such as a change in a credit rating, is transparent, auditable, and compliant with financial regulations.

C. LAYER 3: THE APPLICATION AND EXECUTION LAYER

This is the operational layer where the intelligence generated in Layer 2 is used to automate and optimize financial and tax processes.

- **Smart contracts:** These are self-executing contracts with the terms of the agreement directly written into code. They reside on the blockchain and automatically trigger actions when certain conditions are met. For example, a smart contract could automatically release payment to a supplier once an IoT sensor confirms the delivery of goods to a specific warehouse and a quality inspection is logged on the blockchain.
- **Intelligent supply chain finance (SCF) platform:** This platform uses the AI-driven credit scores to offer dynamic financing options. Approved invoices, verified on the blockchain, can be instantly financed by financial institutions, providing crucial liquidity to suppliers at competitive rates.
- **Automated tax and customs engine:** This module integrates with real-time customs and tax rate databases. As goods cross borders, the system automatically calculates the precise customs duties, VAT, and other applicable taxes based on the product's Harmonized System (HS) code, value, and origin—all verified on the blockchain. It can then automate the preparation of

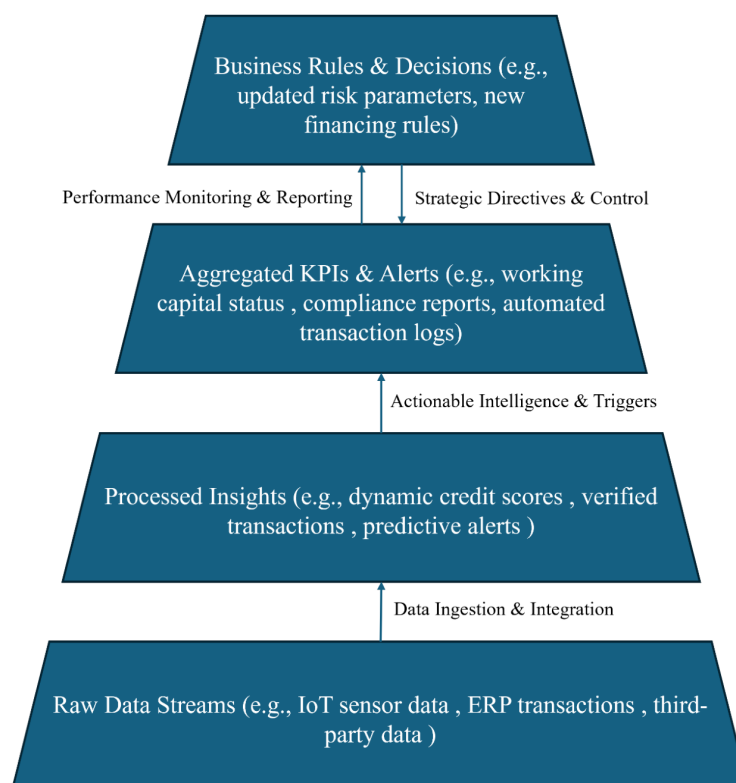


FIGURE 1. The Integrated Framework for Intelligent Finance and Taxation in the Textile Supply Chain

customs declarations and tax filings.

D. LAYER 4: THE STRATEGIC MANAGEMENT AND VISUALIZATION LAYER

This top layer provides decision-makers with a holistic view of the entire supply chain's performance.

- **Control tower dashboard:** A customizable dashboard visualizes key performance indicators (KPIs) in real-time, covering operational metrics (e.g., order-to-delivery time), financial metrics (e.g., working capital, cash conversion cycle), and compliance metrics (e.g., sustainability goal tracking, tax accuracy).
- **Risk management and scenario analysis:** Decision-makers can use the platform to simulate the impact of potential disruptions (e.g., a port closure, a supplier failure, a change in tax law) and develop proactive mitigation strategies.

This integrated framework ensures that every physical event in the supply chain has a corresponding, validated digital and financial footprint, creating a truly connected and intelligent ecosystem.

IV. ANALYSIS OF KEY APPLICATIONS AND IMPACTS

The implementation of the proposed framework translates into tangible applications that can fundamentally reshape the textile supply chain. These applications address core challenges in financial efficiency, tax management, risk, and sustainability.

A. ENHANCING FINANCIAL EFFICIENCY AND LIQUIDITY

The textile supply chain is plagued by inefficient cash flow, disproportionately affecting the SMEs that form its backbone. Intelligent finance directly tackles this issue. When a supplier ships an order to a textile manufacturer, the invoice, purchase order, and proof of delivery (verified by IoT data) are logged on the blockchain. This creates a "trusted" and irrefutable trade event. To illustrate this with a tangible example, consider a small supplier shipping a \$20,000 order of yarn to a manufacturer on 90-day payment terms. Under a traditional model, the supplier might seek invoice financing at a high-risk rate of 12% per annum, costing it approximately \$592 in interest over the 90 days, with funding taking weeks to secure. In the intelligent framework, the IoT-verified delivery and blockchain-validated invoice allow the AI credit model to assess the supplier's real-time performance as low-risk. This could unlock immediate financing at a lower rate of 5% per annum, costing only approximately \$247. This hypothetical but realistic scenario demonstrates a direct cost saving of over 50% and a reduction in funding time from weeks to hours, providing a powerful competitive advantage. The dramatic improvement in the financing process is detailed in Table 1, which contrasts the traditional model with the new intelligent model. Financial institutions participating in the network can see this verified transaction and immediately offer financing to the supplier by purchasing the invoice at a small discount. This process, known as invoice financing or factoring, is

transformed. Instead of a slow, paper-based process that can take weeks, it becomes nearly instantaneous.

Furthermore, the AI-driven credit-scoring model changes the paradigm of SME lending. Traditionally, banks rely on years of audited financial statements, which many small textile suppliers may lack. The intelligent system, however, assesses creditworthiness based on operational performance metrics available in real time from the supply chain data: the supplier's delivery reliability, quality acceptance rates, and order-fulfillment history. A consistently high-performing supplier becomes a lower-risk borrower, enabling them to access working capital at more favorable rates. This injects vital liquidity deep into the supply chain, reducing supplier bankruptcy risk and fostering a more stable and resilient production network. For the buyer (the brand or large manufacturer), this system ensures the financial health of their critical suppliers, mitigating the risk of supply disruptions.

B. IMPROVING TAX COMPLIANCE AND OPTIMIZATION

Global textile supply chains involve a dizzying array of cross-border transactions, each with its own tax implications. The intelligent tax engine is designed to assist in the automation and streamlining of this complexity. Consider, for example, a garment assembled in Vietnam that uses cotton from the United States, fabric woven in China, and zippers from Japan, destined for sale in the European Union. As each component moves across borders, the automated system leverages the blockchain-verified data on each component's origin, composition, and value. It cross-references this with real-time databases of international trade agreements, tariff schedules, and VAT regulations.

The engine can support tax professionals by automatically suggesting the correct Harmonized System (HS) code, calculating estimated customs duties and import VAT, and pre-populating required customs forms for final review and verification. This drastically reduces the risk of costly errors, delays at customs, and penalties for non-compliance. For complex areas like transfer pricing—the pricing of goods and services exchanged between subsidiaries of the same company—the blockchain provides a transparent, auditable record of all inter-company transactions, creating a robust defense against challenges from tax authorities. Moreover, the system can act as a powerful decision-support tool for tax optimization. For instance, it can model different sourcing scenarios to help specialists identify strategies to legally minimize the overall tax burden or help companies take full advantage of tax incentives offered for sustainable practices, such as using recycled materials—evidence that can be irrefutably proven via the blockchain trail. Crucially, given the complexity and dynamic nature of international tax law, the system is envisioned to augment, not replace, human expertise. All automated calculations and suggestions would require validation and oversight by qualified tax professionals before any final determinations or filings are made.

C. STRENGTHENING RISK MANAGEMENT AND TRANSPARENCY

Risk in the textile supply chain is multifaceted, ranging from supplier failure and logistics delays to counterfeiting and reputational damage from unethical practices. The integrated framework provides powerful tools for mitigating these risks. The transparency afforded by blockchain is a primary defense against fraud and reputational damage. Figure 2 provides a detailed illustration of this process, mapping the journey of a sustainable garment from farm to consumer. It distinguishes between the physical material flow (solid arrows) and the corresponding information flow (dashed arrows) that creates the product's digital twin on the blockchain, while also highlighting key financial and tax events that are triggered automatically at each stage. A luxury brand can create a digital "twin" for each of its products on the blockchain. This digital record traces the product's entire journey, from the specific farm that grew the organic cotton to the artisan who stitched the final garment. The end consumer can scan a QR code on the product to view the entire, unalterable history, guaranteeing authenticity and exposing any counterfeit items that lack verifiable provenance.

Beyond product authenticity, AI-powered predictive analytics enhance operational risk management. The system continuously monitors a wide range of data, including supplier performance, shipping lane congestion, weather patterns, and even geopolitical news. By identifying subtle patterns, the AI engine can issue early warnings about potential disruptions. For example, it might flag a supplier whose production quality has been subtly declining over several weeks, signaling a potential future default. Or it might predict a shipping delay at a key port and proactively suggest alternative routes. This shifts risk management from a reactive to a proactive discipline, allowing companies to anticipate and mitigate problems before they escalate.

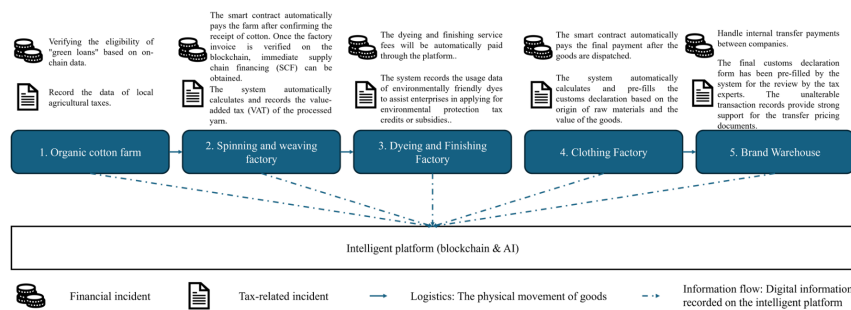
D. DRIVING SUSTAINABILITY AND ETHICAL PRACTICES

Consumer and regulatory demand for sustainable and ethically produced textiles is a major force shaping the industry. Yet, making credible claims about sustainability has always been difficult due to the opacity of the supply chain. The intelligent framework provides the mechanism for verifiable proof. When a brand claims its T-shirts are made from 100% organic cotton, the blockchain can provide an immutable record that traces the cotton back to a certified organic farm. It can log the certificates of compliance at each stage, from ginning and spinning to environmentally friendly dyeing processes.

This verifiable data trail is crucial for green finance. Banks and investment funds are increasingly offering preferential financing terms—or green loans—to companies that can prove their adherence to sustainability standards. The intelligent system provides the trusted, auditable data required to qualify for such financing. The same principle applies to

TABLE 1. Key Feature Comparison: Traditional SCF vs. Intelligent SCF

Feature/Aspect	Traditional SCF	Intelligent SCF
Triggering event	Manual submission of paper/PDF invoice	IoT sensor auto-confirms delivery
Verification process	Manual, error-prone multi-department matching	Smart contract auto-verifies on-chain data; precise and reliable
Core technology	Telephone, email, internal ERP system	Blockchain, IoT, artificial intelligence
Credit assessment	Based on lagging historical financial statements	Based on real-time supply chain performance data
Time to funding	Weeks	Hours
Key challenge	Opaque process, inefficient, difficult for SMEs to access	Data standardization, initial investment costs

**FIGURE 2.** Simplified Traceability Path of a Sustainable Cotton T-shirt

ethical labor practices. By integrating with audited payroll systems or using worker-centric mobile apps, the system can provide greater assurance that fair wages are being paid on time throughout the supply chain. This transparency not only satisfies consumer demands but also helps companies comply with emerging regulations around human rights due diligence in supply chains.

V. DISCUSSION

The integration of intelligent finance and taxation into the textile supply chain represents a paradigm shift with profound implications. This is not merely an exercise in process automation; it is the creation of a commercial ecosystem that can be autonomously optimized under pre-defined governance and constraints. The analysis of its applications reveals a symbiotic relationship where enhanced transparency and data integrity in the supply chain directly fuel more efficient and equitable financial services, which in turn strengthens the entire supply chain. By embedding finance and tax functions directly into the operational flow, the traditional silos that have created so much friction and inefficiency are broken down. The result is a supply chain that is not only faster and cheaper but also more resilient, transparent, and accountable. This transformation could rebalance the power dynamics within the industry, providing small, high-performing suppliers with access to fairly priced capital, thereby fostering innovation and stability at the base of the production pyramid.

It is important to underscore that this paper presents a conceptual framework, and the benefits discussed are based on logical application rather than empirical validation. Given that global supply chain IT systems are often highly fragmented, a 'big bang' approach is not feasible.

Therefore, the proposed framework is envisioned not as a monolithic solution to be deployed at once, but as a modular system suitable for a phased and strategic implementation. A realistic rollout could begin with foundational modules that offer immediate value, such as implementing blockchain and IoT for end-to-end traceability to meet transparency demands. Subsequent phases could then build upon this data foundation, introducing more advanced modules like the AI-driven supply chain finance platform and the automated tax engine. This incremental approach allows the ecosystem to build trust, demonstrate value, and adapt to the diverse technological capabilities of its partners over time, making adoption more manageable and attractive. However, the path to realizing this vision is fraught with significant challenges, among which the most pressing is the risk of exacerbating the "digital divide" within the industry. High implementation costs and complexity may prevent the small and medium-sized enterprises that would benefit most from participating. To ensure inclusiveness and address this issue, a pragmatic, multi-level partner access strategy is crucial, adapted to the diverse technological maturity of supply chain partners. Large partners with advanced technology can be integrated directly with their existing ERP systems via modern APIs. For medium-sized suppliers with basic IT infrastructure but lacking complex integration capabilities, a cloud-based software as a service (SaaS) portal will provide a low-cost, user-friendly interface for managing transactions and accessing financing. For the smallest and least technologically capable micro and small enterprises, the system can offer lightweight mobile applications (mobile apps) to complete key tasks. The platform can even automatically extract data from standardized documents (such as PDF invoices) using robotic process automation (RPA). This hierarchical

approach shifts the burden of technical complexity more onto the central platform rather than onto its most vulnerable users, thereby creating a more accessible and equitable ecosystem that ensures the benefits of intelligent finance can permeate all levels of the supply chain.

Establishing a trusted data-sharing environment, especially among competitors, is arguably the most significant business challenge. The proposal for a neutral industry consortium does not assume competitors will easily share proprietary secrets; rather, it envisages collaboration on shared infrastructure for mutual transactional benefit—a model of co-opetition. A powerful real-world analog is the SWIFT network in banking. Fiercely competitive banks worldwide rely on the shared SWIFT infrastructure for secure financial messaging because the collective benefits of efficiency and standardization are unattainable alone. Similarly, in the textile industry, the goal is not to expose competitive strategies but to create a 'single source of truth' for transactional events (e.g., order-fulfillment, customs clearance) to unlock shared value, such as industry-wide access to lower-cost financing and streamlined compliance.

To make this politically and commercially viable, the platform's governance and technology must be built on a foundation of "trust by design". From a governance standpoint, the consortium must establish legally binding rules for data ownership and access rights from the outset. From a technical standpoint, this trust is enforced through strict protocols. Role-based access control (RBAC) would be rigorously implemented to ensure a supplier can see a brand's purchase order but has zero visibility into that brand's sales data or its dealings with other suppliers. Furthermore, highly sensitive commercial data, such as pricing or specific contract terms, can be handled using off-chain storage, where only a cryptographic proof of the transaction is placed on the blockchain for verification, while the actual sensitive details remain in a private, encrypted repository accessible only to the involved parties. To address this, the governance model managed by a neutral industry consortium would be critical. This consortium, comprising representatives from all stakeholder groups, would establish the legal and operational rules of the platform, including data ownership policies, liability frameworks, and audit rights. From a technical and procedural standpoint, several specific protocols would be essential to build trust and ensure security:

Role-based access control (RBAC): A permissioned blockchain would ensure that participants can only view data relevant to their role. For example, a raw material supplier would not have access to the final brand's sales data, and a logistics provider would only see relevant shipping information.

Data encryption: All data would be protected with end-to-end encryption in transit and encryption at rest. For highly sensitive commercial data such as pricing, the system could employ off-chain storage: only an immutable cryptographic hash (a digital fingerprint) of the data would be placed on

the blockchain for verification, while the actual data remain in a secure, private repository.

Dispute resolution protocol: Since blockchain data is immutable, a clear protocol for correcting errors is vital. This could be handled via a dispute resolution smart contract. If an error is logged (e.g., incorrect quantity), a correcting transaction would require digital signatures from the involved parties (e.g., supplier and recipient) to be validated and linked to the original, creating a fully transparent and auditable trail of the correction. Third, the challenge of interoperability cannot be overstated and is arguably the greatest practical barrier to implementation. The global textile supply chain is a heterogeneous IT environment, ranging from multinational corporations with modern ERP systems to small-scale suppliers relying on outdated software or spreadsheets. Simply proposing "open standards and APIs," while necessary, does not adequately address the complexity of integrating diverse legacy systems. A more pragmatic approach would require a multitiered strategy. For large, technically capable partners, API-based integration is feasible. However, for the multitude of smaller suppliers, a successful framework must offer lower-barrier-to-entry solutions. This could include leveraging middleware or Integration Platform as a Service (iPaaS) solutions to act as translators between systems, or providing secure web portals for manual data uploads. In some cases, RPA could even be used to extract data from standardized documents like PDFs or emails as an interim step. Ultimately, a long-term, scalable solution would necessitate an industry-wide consortium to develop shared data standards, analogous to the SWIFT system in banking, to create a common language for textile supply chain transactions. Finally, dealing with the complex and constantly evolving global regulatory environment is a formidable challenge. The operation of this framework intersects with multiple legal domains and requires an active and deeply integrated compliance strategy. For instance, cross-jurisdictional data collection and sharing immediately involve compliance with strict data privacy regulations such as the EU's General Data Protection Regulation (GDPR). To ensure compliance, the system must be based on privacy-by-design principles, incorporating data minimization and pseudonymization. Moreover, all parties involved need to sign strong data processing agreements (DPAs), and cross-border data transmission must follow legally recognized mechanisms such as standard contractual clauses (SCCs) to ensure legal operation. Another major obstacle is the legal status of smart contracts, whose legal effect globally has not yet been uniformly established. Therefore, a pragmatic initial approach is to use smart contracts as automated execution engines that reflect the terms of traditional legal contracts, rather than treating them as independent legal agreements. The code logic of smart contracts will directly reflect the legally binding terms of paper agreements, thereby ensuring that automated actions such as payment release have a solid legal foundation. Addressing these legal and regulatory obstacles, including

dealing with liability issues when there are errors driven by artificial intelligence or blockchain failures, is not only a technical task but also a strategic one. It requires continuous legal supervision and cooperation with policymakers to build a smart and fully compliant framework. Overcoming these barriers will require a concerted effort involving not just individual companies but also industry-wide collaboration and proactive engagement with policymakers and regulators.

VI. CONCLUSION

This paper has explored the transformative application of intelligent finance and taxation in the management of textile industry supply chains. It has moved beyond a siloed view of technology to propose an integrated, multi-layered framework where the seamless flow of data from IoT and integrated systems fuels a powerful engine of AI, blockchain, and cloud computing. This engine, in turn, enables a suite of applications—from automated supply chain finance and real-time tax compliance to blockchain-verified traceability and proactive risk management—that address the most deep-seated challenges of efficiency, transparency, and sustainability in the industry. The analysis demonstrates that the convergence of these technologies can create a more resilient, equitable, and competitive textile ecosystem.

The core contribution of this work is the presentation of a holistic vision that directly links operational data with financial and administrative functions, creating a single source of truth for all stakeholders. The implications are far-reaching: capital can be allocated more efficiently, risk can be managed more proactively, regulatory compliance can be automated with greater accuracy, and claims of sustainability and authenticity can be backed by immutable proof. This shift has the potential to redefine relationships between brands, suppliers, financiers, and consumers, fostering a new era of trust and collaboration.

Nevertheless, the journey towards this future is not without its obstacles. The significant challenges of implementation cost, data governance, system interoperability, and regulatory ambiguity must be pragmatically addressed. Widespread adoption will necessitate not only technological innovation but also new business models, industry-wide standards, and a supportive policy environment. A critical next step for future research is to move from conceptualization to application. Empirical case studies and pilot programs are essential to quantitatively validate the benefits and calculate the return on investment (ROI) of such integrated systems in real-world textile supply chains. Further investigation is also needed to develop scalable, low-cost solutions for SMEs and to establish robust governance frameworks for data sharing. In conclusion, while the path is complex, the strategic integration of intelligent finance and taxation is an essential and inevitable evolution for the textile industry, promising to weave a stronger, smarter, and more sustainable fabric for global trade.

AUTHOR CONTRIBUTIONS

Ying Su designed, collected and analyzed the data, and drafted the manuscript. Ying Su conducted the study, critically revised the manuscript for important intellectual content, and gave final approval of the version to be published. Ying Su participated fully in the work, take public responsibility for appropriate portions of the content, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

CONFLICT OF INTEREST

The author declares no conflict of interest.

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AVAILABILITY OF DATA AND MATERIALS

The datasets used and/or analysed during the current study were available from the corresponding author on reasonable request.

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REFERENCES

- [1] M. A. Franco, "Circular economy at the micro level: A dynamic view of incumbents' struggles and challenges in the textile industry," *Journal of Cleaner Production*, vol. 168, pp. 833-845, 2017.
- [2] T. A. Malik, "Navigating Sustainable Supply Chains in Pakistan's Textile Industry: Addressing Regulatory, Infrastructural, and Social Challenges for Enhanced Sustainability," 2024, [Online]. Available: <https://urn.fi/URN:NBN:fi-fe2024080163228>.
- [3] F. H. Abernathy, J. T. Dunlop, J. H. Hammond, and D. Weil, "A Stitch in Time: Lean Retailing and the Transformation of Manufacturing—Lessons from the Apparel and Textile Industries," Oxford, UK: Oxford University Press; 1999.
- [4] M. Boström and M. Michelett, "Introducing the sustainability challenge of textiles and clothing," *Journal of Consumer Policy*, vol. 39, no. 4, pp. 367-375, 2016.
- [5] E. Hofmann and H. Kotzab, "A supply chain-oriented approach of working capital management," *Journal of Business Logistics*, vol. 31, no. 2, pp. 305-330, 2010.
- [6] T. J. Goldsby and S. J. García-Dastugue, "The manufacturing flow management process," *The International Journal of Logistics Management*, vol. 14, no. 2, pp. 33-52, 2003.
- [7] O. K. Akinsola, "The Impact of International Trade Laws on Corporate Strategy: Navigating Cross-Border Legal Challenges for Multinational Corporations," 2025, [Online]. Available: https://www.researchgate.net/profile/Beauden-John/publication/388659851_The_Impact_of_International_Trade_Laws_on_Corporate_Strategy_Navigating_Cross-Border_Legal_Challenges_for_Multinational_Corporations/links/67a196e08311ce680c505c9d/The-Impact-of-International-Trade-Laws-on-Corporate-Strategy-Navigating-Cross-Border-Legal-Challenges-for-Multinational-Corporations.pdf.
- [8] A. S. George, "Finance 4.0: The transformation of financial services in the digital age," *Partners Universal Innovative Research Publication*, vol. 2, no. 3, pp. 104-125, 2024.
- [9] M. Malempati, "Transforming Payment Ecosystems through the Synergy of Artificial Intelligence, Big Data Technologies, And Predictive Financial Modeling," *Big Data Technologies, And Predictive Financial Modeling* (November 07, pp.). 2022, 2022.
- [10] S. R. Challa, "The Digital Future of Finance and Wealth Management with Data and Intelligence," San Francisco, CA, USA: Deep Science Publishing; 2025.

- [11] R. B. Handfield and E. L. Nichols, "Supply Chain Redesign: Transforming Supply Chains into Integrated Value Systems," New York, NY, USA: Ft Press; 2002.
- [12] M. Shahrokhi, "E-finance: Status, innovations, resources and future challenges," *Managerial Finance*, vol. 34, no. 6, pp. 365-398, 2008.
- [13] H. L. Lee, V. Padmanabhan, and S. Whang, "Information distortion in a supply chain: The bullwhip effect," *Management Science*, vol. 43, no. 4, pp. 546-558, 1997.
- [14] M. Bruce, L. Daly, and N. Towers, "Lean or agile: A solution for supply chain management in the textiles and clothing industry? *International Journal of Operations & Production Management*," 2004; 24(2):151-170.
- [15] M. Anner, "Squeezing workers' rights in global supply chains: Purchasing practices in the Bangladesh garment export sector in comparative perspective," *Review of International Political Economy*, vol. 27, no. 2, pp. 320-347, 2020.
- [16] A. Life-Cycle and S. Framework, "Environmental Impacts in the Fashion Industry," *Textiles, Fashion and Sustainability: A special theme issue of The Journal of Corporate Citizenship (Issue 45)*, vol. (45), pp. 17, 2012.
- [17] D. Köksal, J. Strähle, M. Müller, and M. Freise, "Social sustainable supply chain management in the textile and apparel industry—A literature review," *Sustainability*, vol. 9, no. 1, pp. 100, 2017.
- [18] E. Hofmann and M. Rüsch, "Industry 4.0 and the current status as well as future prospects on logistics," *Computers in Industry*, vol. 89, pp. 23-34, 2017.
- [19] T. K. Agrawal, V. Kumar, R. Pal, L. Wang, and Y. Chen, "Blockchain-based framework for supply chain traceability: A case example of textile and clothing industry," *Computers & Industrial Engineering*, vol. 154, Art. no. 107130, 2021.
- [20] N. Kshetri, "1 Blockchain's roles in meeting key supply chain management objectives," *International Journal of Information Management*, vol. 39, pp. 80-89, 2018.
- [21] D. L. K. Chuen and R. H. Deng, "Handbook of Blockchain, Digital Finance, and Inclusion, Volume 2: ChinaTech, Mobile Security, and Distributed Ledger," Cambridge, MA, USA: Academic Press; 2017.