BLOCKCHAIN-BASED SUPPLY CHAIN FINANCE FOR WEST JAVA'S SPECIALTY COFFEE: A STRATEGIC OPERATION MODEL

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DOCTOR OF MANAGEMENT AND BUSINESS
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SUMMARY

ASADUDDIN ABDULLAH. Blockchain-Based Supply Chain Finance for West Java's Specialty Coffee: A Strategic Operation Model. Supervised by ARIF SATRIA, HETI MULYATI, YANDRA ARKEMAN, and DIKKY INDRAWAN.

This research investigates the transformative potential of blockchain technology (BCT) within the supply chain finance (SCF) framework in West Java's specialty coffee industry. The industry, while holding significant economic promise as the fifth largest Indonesian export product, grapples with challenges related to transparency, traceability, and equitable value distribution among stakeholders (Borrella et al. 2015; Van Keulen and Kirchherr 2021; Renard 2005; Brooks et al. 2021). BCT, with its decentralized and transparent ledger system, offers a viable solution to enhance traceability, ensure authenticity, and streamline processes, thereby fostering a more sustainable and inclusive coffee sector (Giegling 2022; Tyagi and Goyal 2023). The integration of BCT with SCF can optimize working capital and liquidity, empower small-scale farmers, facilitate smoother international transactions, and ensure fairer profit distribution (Ioannou and Demirel 2022; Chang et al. 2019).

The main objectives of this study were to analyze existing value chain governance, identify barriers to BCT adoption, evaluate stakeholder perceptions, and develop a strategic operating model for BCT-based SCF in the West Java specialty coffee industry. The scope of this study focused on the specialty coffee industry in West Java, from production to processing and distribution, without delving into the technical implementation of blockchain systems (Borrella et al. 2015). To address the complexity of this research, a comprehensive methodological approach was designed through a combination of qualitative-quantitative methods (mixed methods).

Operationally, data collection was conducted through a triangulation of techniques including in-depth interviews with key stakeholders, participatory observation in the field, and the distribution of structured questionnaires. The research locus covered two specialty coffee production centers in West Java - Pangalengan (Bandung Regency) and Garut, which represent 65% of regional specialty coffee production. The research structure consists of four main stages: analyzing the governance structure, identifying variables that influence BCT-based SCF integration, understanding stakeholder roles and responses, and developing a strategic operating model.

The study's findings highlighted several critical aspects of BCT adoption in the specialty coffee industry. Firstly, the research identified a disparity in research priorities between the Global North and the Global South concerning BCT-enabled SCF. While the Global North emphasizes efficiency, ethical sourcing, and traceability, the Global South focuses on value addition, transparency, and fair pricing (Ioannou & Demirel, 2022; Wang et al., 2022). The Global South also prioritizes reliable financial transactions and risk mitigation, whereas the Global

North is more concerned with economic benefits and efficiency (Ioannou and Demirel 2022).

Secondly, the research revealed diverse governance structures within West Java's specialty coffee industry, each influencing collaboration and risk management. These structures include the Integrated-Roastery Chain (hierarchical), the Cooperative Chain (relational), the Quality-Focused Collectors Chain (modular), and the Informal Trader Chain (captive). Digital technologies, particularly BCT-enabled smart contracts, can enhance transparency and traceability across these structures, promoting fair pricing and improving supply chain efficiency.

Thirdly, the study identified key barriers to BCT adoption, categorized into two levels based on their driving and dependence power. Level 1 barriers, which exert greater influence, include lack of support, regulatory uncertainty, lack of collaboration, and lack of legality. Level 2 barriers, more dependent on other factors, encompass lack of infrastructure, technical challenges, and lack of awareness. Addressing these barriers is crucial for creating a supportive environment for successful blockchain implementation.

Finally, the research proposed a strategic operational model for BCT-enabled SCF, utilizing the SAP-LAP framework. This model outlines a structured approach to transition from the current state, characterized by fragmented systems and manual processes, to a desired future state featuring smart contracts, traceability, and enhanced stakeholder collaboration. The SAP-LAP analysis highlights the need for learning about blockchain and SCF, taking action towards system integration and value creation, and ultimately reaching a performance level characterized by smart contracts, traceability, and stakeholder collaboration.

In conclusion, this research contributes valuable insights to the emerging field of BCT application in the coffee industry. It emphasizes the importance of "fair price" and "value addition" in achieving equitable outcomes in global trade, a concept previously underexplored. The study's multi-stakeholder approach and the use of the SAP-LAP framework provide a clear roadmap for implementing BCT-enabled solutions. By addressing the identified barriers and adopting the proposed strategic operational model, stakeholders can enhance the competitiveness and sustainability of the Indonesian specialty coffee industry, ensuring more transparent, inclusive, and equitable outcomes for all.

Keywords: Blockchain Technology (BCT), Specialty Coffee Industry, Strategic Operational Model, Supply Chain Finance (SCF), Transparency and Traceability

RINGKASAN

ASADUDDIN ABDULLAH. Keuangan Rantai Pasok Berbasis Blockchain untuk Kopi Spesial Jawa Barat: Model Operasi Strategis. Dibimbing oleh ARIF SATRIA, HETI MULYATI, YANDRA ARKEMAN, and DIKKY INDRAWAN.

Penelitian ini mengkaji potensi teknologi blockchain (BCT) untuk mentransformasi pembiayaan rantai pasok (SCF) di industri kopi spesialti Jawa Barat. Industri ini, meskipun memiliki potensi ekonomi yang besar sebagai produk ekspor kelima terbesar di Indonesia, menghadapi tantangan terkait transparansi, keterlacakan, dan distribusi nilai yang adil di antara para pemangku kepentingan (Borrella et al. 2015; Van Keulen dan Kirchherr 2021; Renard 2005; Brooks et al. 2021). BCT, dengan sistem buku besar yang terdesentralisasi dan transparan, menawarkan solusi yang menjanjikan untuk meningkatkan keterlacakan, memastikan keaslian, dan merampingkan proses, sehingga mendorong sektor kopi yang lebih berkelanjutan dan inklusif (Giegling 2022; Tyagi dan Goyal 2023). Integrasi BCT dengan SCF dapat mengoptimalkan modal kerja dan likuiditas, memberdayakan petani skala kecil, memfasilitasi transaksi internasional yang lebih lancar, dan menjamin pembagian keuntungan yang lebih adil (Ioannou dan Demirel 2022; Chang et al. 2019).

Tujuan utama penelitian ini adalah menganalisis tata kelola rantai nilai yang ada, mengidentifikasi hambatan dalam adopsi BCT, mengevaluasi persepsi pemangku kepentingan, dan mengembangkan model operasi strategis untuk SCF berbasis BCT di industri kopi spesialti Jawa Barat. Ruang lingkup penelitian ini difokuskan pada industri kopi spesialti di Jawa Barat, mulai dari produksi hingga pengolahan dan distribusi, tanpa mendalami implementasi teknis sistem blockchain (Borrella et al. 2015). Untuk menjawab kompleksitas penelitian ini, pendekatan metodologis dirancang secara komprehensif melalui kombinasi metode kualitatif-kuantitatif (*mixed methods*).

Secara operasional, pengumpulan data dilakukan melalui triangulasi teknik yang meliputi: wawancara mendalam dengan pemangku kepentingan kunci, observasi partisipatif di lapangan, serta penyebaran kuesioner terstruktur. Lokus penelitian mencakup dua sentra produksi kopi spesialti di Jawa Barat - Pangalengan (Kabupaten Bandung) dan Garut yang merepresentasikan 65% produksi kopi spesialti regional. Struktur penelitian terdiri dari empat tahap utama: menganalisis struktur tata kelola, mengidentifikasi variabel yang memengaruhi integrasi SCF berbasis BCT, memahami peran dan respons pemangku kepentingan, dan mengembangkan model operasi strategis.

Temuan penelitian menyoroti beberapa aspek penting terkait adopsi BCT di industri kopi spesialti. Pertama, penelitian ini menemukan adanya perbedaan prioritas penelitian antara negara-negara maju dan negara-negara berkembang dalam hal SCF berbasis BCT. Negara-negara maju cenderung menekankan efisiensi, sumber daya etis, dan keterlacakan, sementara negara-negara berkembang lebih fokus pada penambahan nilai, transparansi, dan harga yang adil (Ioannou &

Demirel, 2022; Wang et al. 2022). Negara-negara berkembang juga memprioritaskan transaksi keuangan yang andal dan mitigasi risiko, sedangkan negara-negara maju lebih mementingkan manfaat ekonomi dan efisiensi (Ioannou dan Demirel 2022).

Kedua, penelitian ini mengungkap beragam struktur tata kelola dalam industri kopi spesialti Jawa Barat, yang masing-masing memengaruhi kolaborasi dan manajemen risiko. Struktur-struktur ini meliputi Rantai Terintegrasi-Roastery (hierarkis), Rantai Koperasi (relasional), Rantai Pengumpul Fokus Kualitas (modular), dan Rantai Pedagang Informal (captive). Teknologi digital, khususnya kontrak pintar berbasis BCT, dapat meningkatkan transparansi dan keterlacakan di berbagai struktur ini, mendorong penetapan harga yang lebih adil dan meningkatkan efisiensi rantai pasok.

Ketiga, penelitian ini mengidentifikasi hambatan-hambatan utama terhadap adopsi BCT, yang dikategorikan ke dalam dua tingkatan berdasarkan daya dorong dan tingkat ketergantungannya. Hambatan Tingkat 1, yang memiliki pengaruh lebih besar, meliputi kurangnya dukungan, ketidakpastian regulasi, kurangnya kolaborasi, dan kurangnya legalitas. Hambatan Tingkat 2, yang lebih bergantung pada faktor-faktor lain, mencakup kurangnya infrastruktur, tantangan teknis, dan kurangnya kesadaran. Mengatasi hambatan-hambatan ini sangat penting untuk menciptakan lingkungan yang mendukung keberhasilan implementasi blockchain.

Terakhir, penelitian ini mengusulkan model operasional strategis untuk SCF berbasis BCT, dengan memanfaatkan kerangka kerja SAP-LAP. Model ini menguraikan pendekatan terstruktur untuk bertransisi dari kondisi saat ini, yang ditandai dengan sistem yang terfragmentasi dan proses manual, menuju kondisi masa depan yang diinginkan yang menampilkan kontrak pintar, keterlacakan, dan kolaborasi pemangku kepentingan yang lebih baik. Analisis SAP-LAP menekankan perlunya pembelajaran tentang blockchain dan SCF, pengambilan tindakan menuju integrasi sistem dan penciptaan nilai, dan pada akhirnya, pencapaian tingkat kinerja yang ditandai dengan kontrak pintar, keterlacakan, dan kolaborasi pemangku kepentingan.

Sebagai kesimpulan, penelitian ini memberikan wawasan yang berharga bagi bidang yang sedang berkembang, yaitu penerapan BCT di industri kopi. Penelitian ini menekankan pentingnya "harga yang adil" dan "penambahan nilai" dalam mencapai hasil yang adil dalam perdagangan global, sebuah konsep yang sebelumnya kurang dieksplorasi. Pendekatan multi-pemangku kepentingan dalam penelitian ini dan penggunaan kerangka kerja SAP-LAP memberikan panduan yang jelas untuk mengimplementasikan solusi berbasis BCT. Dengan mengatasi hambatan-hambatan yang teridentifikasi dan mengadopsi model operasional strategis yang diusulkan, para pemangku kepentingan dapat meningkatkan daya saing dan keberlanjutan industri kopi spesialti Indonesia, memastikan hasil yang lebih transparan, inklusif, dan adil bagi semua pihak.

Kata Kunci: Industri Kopi Spesialiti, Keuangan Rantai Pasok (SCF), Model Operasi Strategis, Teknologi Blockchain (BCT), Transparansi dan Keterlacakan

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FOREWORD

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This scientific work, though far from perfect, is a humble contribution to the field of blockchain technology and supply chain finance. I hope it will serve as a useful resource for those in need and contribute to the advancement of knowledge in this area.

Bogor, May 2025

Asaduddin Abdullah

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GLOSSARIES

Blockchain Technology (BCT)	A decentralized digital ledger technology that enhances transparency, traceability, and security in transactions, often used in supply chain finance.
Captive Governance	A governance structure where small producers are heavily reliant on a single buyer or intermediary, often leading to power imbalances and limited market access.
Cooperative Model	A governance structure where smallholder farmers pool their resources and expertise to collectively manage production, processing, and marketing, often through a cooperative organization
Digital Transformation	The integration of digital technologies into all aspects of business operations, often leading to increased efficiency and innovation.
Economic Inclusion	The integration of marginalized groups, such as smallholder farmers, into the formal economy, often through access to financial services and markets.
Equitable Value Distribution	Fair and just allocation of profits and benefits among all stakeholders in the supply chain.
ERP System	Enterprise Resource Planning systems that integrate various business processes, often used in vertically integrated value chains to streamline operations.
Global North	A term referring to economically developed countries, typically in North America, Europe, and parts of Asia, often characterized by advanced technological infrastructure.
Global South	A term referring to developing or less economically developed countries, often in Africa, Latin America, and parts of Asia, typically facing challenges related to infrastructure and resource access.
Global Value Chain (GVC)	The international network of activities involved in the production and distribution of a product, often involving multiple countries and actors.
Governance Structure	The framework of rules, practices, and processes by which an organization or industry is directed and controlled.

GLOSSARIES (CONTINUE)

Hierarchical Governance	A tightly coordinated governance structure characterized by vertical integration and managerial control, often seen in integrated-roastery chains.
Informal Finance	Financial transactions that occur outside regulated institutions, often based on personal relationships and trust.
Informal Trader	A trader who operates outside formal financial and regulatory systems, often relying on personal relationships and trust for transactions.
Information and Communication Technology (ICT)	Technologies that facilitate communication and information sharing, such as mobile banking and online platforms, often used to improve access to finance and market information.
Information Asymmetry	A situation where one party in a transaction has more or better information than the other, often leading to inefficiencies or exploitation.
Market-Based Governance	A loosely coordinated governance structure driven primarily by price and availability, with minimal formal coordination between actors.
Middleman	An intermediary in the value chain who buys products from producers and sells them to processors or retailers, often controlling the flow of goods and finances.
Modular Governance	A governance structure where specialized intermediaries coordinate transactions and set quality standards, often seen in quality-focused collector chains.
Relational Structure:	A governance structure that fosters collaboration and resource sharing among participants.
SAP-LAP Framework	A framework used to analyze the transition from the current state to the desired future state in a process of change.
Smart Contracts	Self-executing contracts with the terms of the agreement directly written into code, often used in blockchain-based supply chain finance to automate transactions.

GLOSSARIES (CONTINUE)

Specialty Coffee	High-quality coffee that is graded based on specific criteria such as flavor, aroma, and origin. It often commands premium prices due to its unique characteristics.
Strategic Operation Model	A framework developed to guide the implementation and operation of BCT-enabled SCF.
Supply Chain Finance (SCF)	A set of financial solutions that optimize cash flow by allowing businesses to lengthen their payment terms to suppliers while providing suppliers with the option of receiving early payment.
Traceability	The ability to track the movement of a product through all stages of the value chain, from production to consumption, often important for quality control and sustainability.
Transaction Cost Economics (TCE)	A theoretical framework that explains how different governance structures minimize transaction costs, which include costs related to information, negotiation, monitoring, and enforcement.
Transparency	The quality of being open and honest, allowing stakeholders to have full access to information.
Value Added	The increase in the value of a product at each stage of the value chain, often measured by the difference between the cost of inputs and the price of outputs.
Value Chain Governance	The way in which activities, resources, and information are coordinated and controlled within a value chain, often involving power dynamics between different actors.
Value Chain	The series of activities or business processes involved in the production and distribution of a product or service.