



FINEDA

BLOCKCHAIN IN SUPPLY CHAIN MANAGEMENT

June 2025

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BLOCKCHAIN IN SUPPLY CHAIN MANAGEMENT

May 2025

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Brief Summary of the Blockchain technology

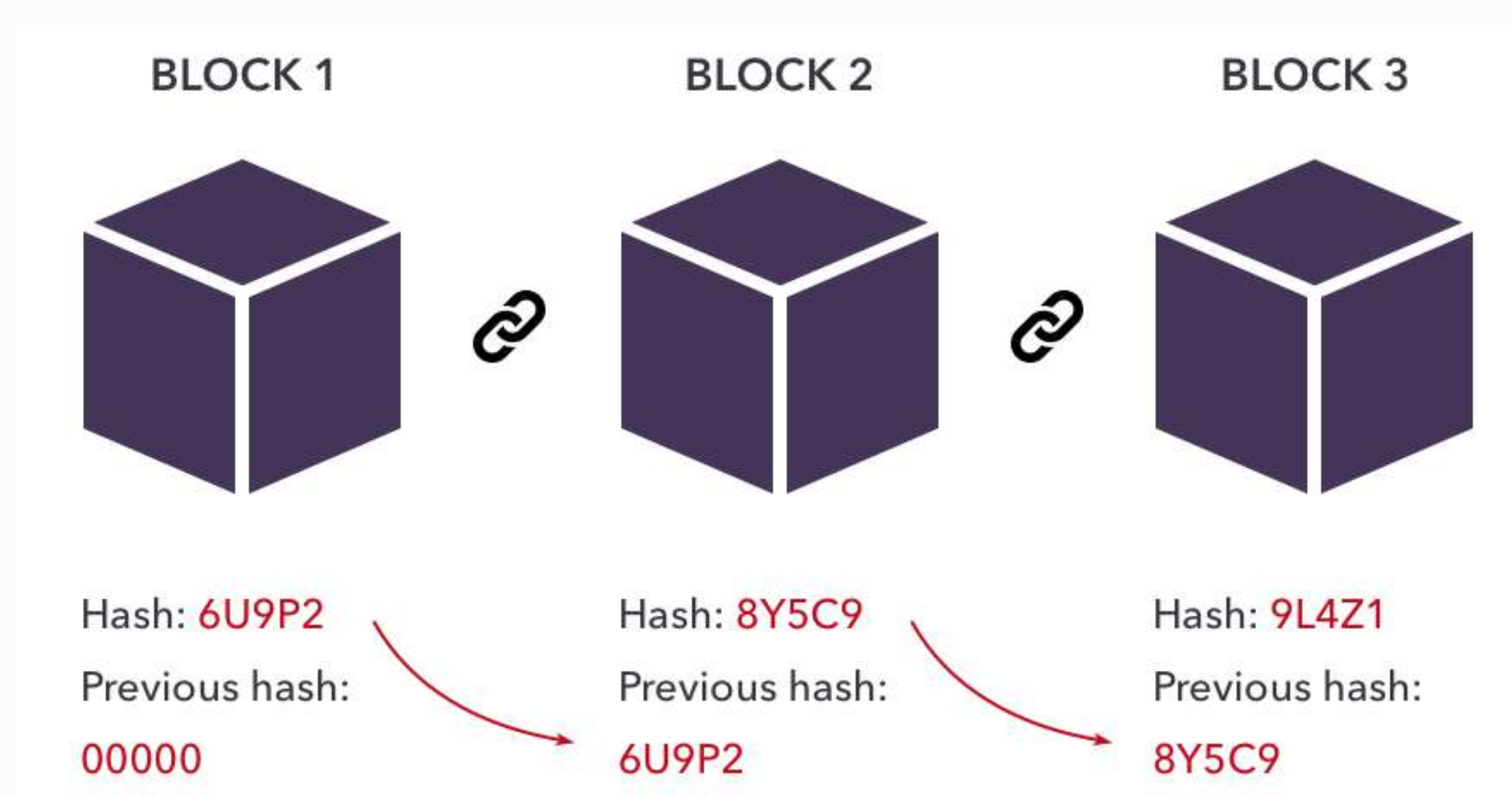


Figure 1: Capturing the Details of a Simple Transaction, Conventional vs. Blockchain Systems

Blockchain technology is **revolutionising supply chain management** by reshaping how goods and services are moved around the world. In essence, **blockchain is a digital ledger that allows multiple parties to record transactions without the need for intermediaries**. Transactions on the blockchain are **cryptographically protected**, ensuring the integrity of data and preventing interferences.

At its essence, **blockchain is a series of data blocks, securely linked in an uneditable, digital chain** which enables to transact digital assets in a **peer-to-peer network**. The information is thus stored in an open-source, **decentralized environment**, shared transparently among parties regardless of geography or status. It revolves around a decentralized approach by **replacing traditional hierarchical systems** (eg: SWIFT, SAP, IRS), fostering greater stakeholder trust by ensuring transparent and tamper-proof interactions and scalability in handling increasing transaction volumes, data, and global participants seamlessly.

The nature of the blockchain ecosystem prevents anyone from tampering with information once it has been added to the chain. Each block, or data record, is digitally signed with a cryptographic 'hash,' the result of a mathematical algorithm, which acts as a digital fingerprint. The blocks are linked together **as each block includes the hash of the previous block in its chain** (see the Figure 3 below). Hence, if any of the content within a block is altered, the computed hash will no longer match the original hash – and the change will be detected.

In supply chain management, blockchain addresses key issues such as **transparency, traceability, efficiency, and security**. It allows stakeholders to **monitor goods in real time** from the raw materials to the consumer. This **improves efficiency by reducing theft, fraud, and product expiration**. By leveraging blockchain, companies can **enhance logistics processes and improve inventory forecasts, demand planning, and delay management**. This fosters better collaboration between supply chain partners, increasing efficiency and reducing costs.

The **decentralised nature** of blockchain allows various parties to transact confidentially and securely without **reliance on intermediaries**, which reduces bottlenecks and enhances business agility.

Application of blockchain can also address regulatory compliances such as **EU Corporate Sustainability Due Diligence Directive** that enforces **transparency and truthful reporting of sustainable action**. Blockchain can contribute to this in a substantial way by ensuring reliable, verifiable records that can be accessed by relevant stakeholders and audit bodies.

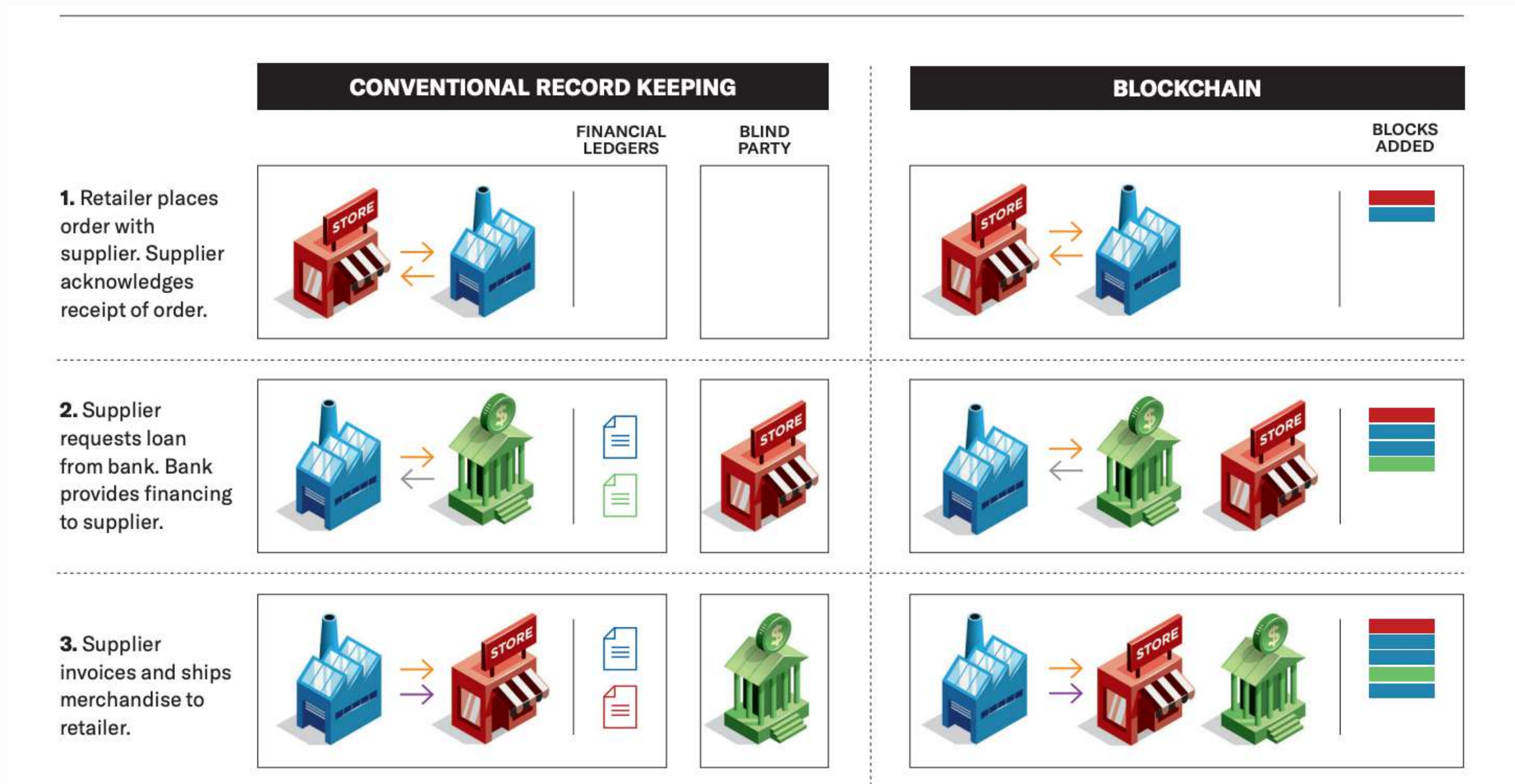
Despite the offerings, there is a **high cost of implementation** associated with applying blockchain in supply chains, such as **high-power consumption and technical expertise requirements, as significant barriers for adoption**. Further, the absence of a standardized protocol across diverse blockchain networks results in **compatibility issues**. Another limitation is **blockchain's current inability to process huge volumes of transactions** required for handling complex global supply chains without impact to operational efficiency.

Despite challenges, blockchain remains an exciting technology with the **potential to revolutionize supply chains**. The global blockchain market is reflecting this momentum, with a **forecasted increase from USD 17.19 B in 2023 to over USD 1.2 T by 2030, at a compound annual growth rate of over 80%**. This explosive growth is being fueled by adoption of blockchain in the logistics, food safety, pharmaceuticals, and manufacturing sectors. In parallel, **substantial venture capital and corporate investment is accelerating blockchain-based solutions** for supply chains. **North America is currently the leading region**, but others are catching up, demonstrating strong, sustained global interest. As standardization improves and blockchain technology becomes more scalable, blockchain will solidify its place as a foundational component of the next generation of supply chain ecosystems.

Cross-Industry Applications and Impact

Blockchain technology is revolutionizing supply chain management by offering a **secure, transparent, and immutable ledger that records transactions** and asset movements across the entire value chain. Its **capacity to tokenize information, similar to how RFID tags or electronic product codes** track inventory, enables companies to reduce operational costs, enhance process efficiency, and ensure ethical sourcing. A **wide range of industries**— from logistics and healthcare, to retail and government **are adopting this digital transformation**.

Figure 2: Capturing the Details of a Simple Transaction, Conventional vs. Blockchain Systems



Source: Harvard Business Review

1. Logistics and Transportation

Building on the logistical improvements, the retail sector has embraced blockchain to enhance transparency and customer trust.

The **transportation and freight sectors** were among the first to recognize blockchain's potential. By creating tamper-proof records of transactions and logistics data, blockchain minimizes disputes and improves operational efficiency.

Walmart Canada implemented blockchain through its DL Freight platform to streamline freight invoice management. Prior to adoption, 70% of invoices had discrepancies; post-implementation, that number dropped to less than 1%.

FedEx, UPS, and Delta are among the 500 members of the **Blockchain in Transport Alliance (BiTA)**, established in 2017 to create standards and promote adoption in logistics.

Maersk and IBM co-developed **TradeLens**, a blockchain platform that **digitizes global shipping documentation** to enhance visibility and minimize delays in maritime logistics.

2. Retail and Consumer Goods

Retail giants are using blockchain to **enhance transparency, optimize product tracking, and validate sourcing claims** throughout their supply chains.

Walmart partnered with IBM to develop Food Trust, a blockchain solution that **tracks food from farm to shelf in seconds** rather than days. It significantly **boosts food safety and recall efficiency**.

Nestlé, along with **Carrefour**, enabled consumers to **scan QR codes on products**, like Mousline mashed potatoes, to **access real-time supply chain information** using IBM's blockchain technology.

L'Oréal adopted blockchain to **ensure the ethical and sustainable sourcing of raw materials**, enhancing consumer trust and brand accountability.

Procter & Gamble uses blockchain to **manage product traceability and streamline return processes** by generating tamper-proof product movement histories.

3. Food and Agriculture

The food industry benefits significantly from blockchain's traceability, especially in **verifying sustainability and ethical sourcing**.

Unilever piloted SAP GreenToken to trace over 188,000 tons of sustainably sourced palm oil. The blockchain solution allowed **tracking the proportion of sustainable materials** used from source to shelf.

IBM Food Trust, in collaboration with Nestlé, Walmart, and Carrefour, enables **real-time tracking of food origins**, significantly reducing time spent on audits and increasing consumer transparency.

4. Healthcare and Pharmaceuticals

In an industry where regulation and patient safety are essential, blockchain **secures inventory tracking, patient verification, and regulatory compliance**.

MediLedger, a consortium including **Pfizer and Genentech**, developed a blockchain platform to **prevent counterfeit drugs, ensure medication authenticity, and improve compliance with pharmaceutical regulations**.

DHL, in healthcare logistics, uses blockchain to **boost inventory accuracy and reduce stock delays**, critical in pharmaceutical and medical supply chains.

5. Ethical and Sustainable Production

Blockchain enables companies to **trace materials across their supply chains, ensuring ethical sourcing and fostering accountability.**

De Beers utilizes **Tracr**, a **blockchain system that digitally traces diamonds from mine to retail.** This ensures conflict-free certification and combats fraudulent practices in the diamond trade.

In the **lithium battery industry**, manufacturers are using blockchain to **create digital twins**—tokens containing product origin and certification details—to **prevent counterfeiting and maintain quality assurance.**

6. Electronics and Technology

Tech companies leverage blockchain to **monitor complex supply chains** involving high-value components and global suppliers.

Amazon is piloting blockchain solutions to **enhance the authenticity, traceability, and operational efficiency of its electronics supply chains.**

7. Government and Institutional Use

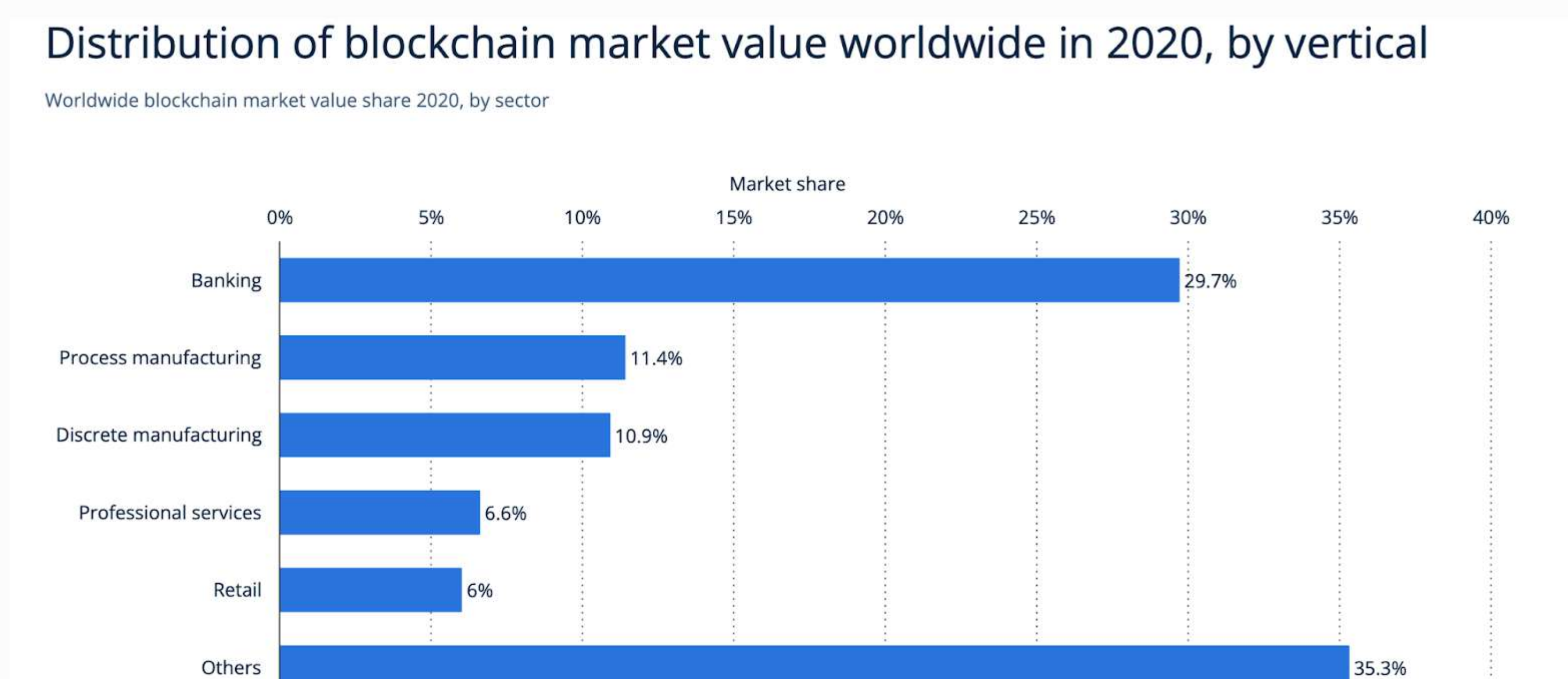
Governments are adopting blockchain to **digitize and secure critical public records and infrastructures.**

The Chinese government is investing heavily in blockchain to **modernize national supply chains**, aiming to reduce fraud and increase transparency across industries.

The Georgian government partnered with **Bitfury** to establish a **blockchain-based land registry**, increasing transparency in real estate transactions and reducing fraud.

MIT implemented blockchain-secured **digital diplomas**, giving graduates verifiable, tamper-proof credentials easily shareable with employers.

Figure 3: Distribution of blockchain market value worldwide, by sector



Source: Polaris Market Research; Statista

Core Blockchain Features in Supply Chain Applications

Transparency: Blockchain creates a single, accessible version of the truth for all parties in the supply chain, reducing blind spots and discrepancies.

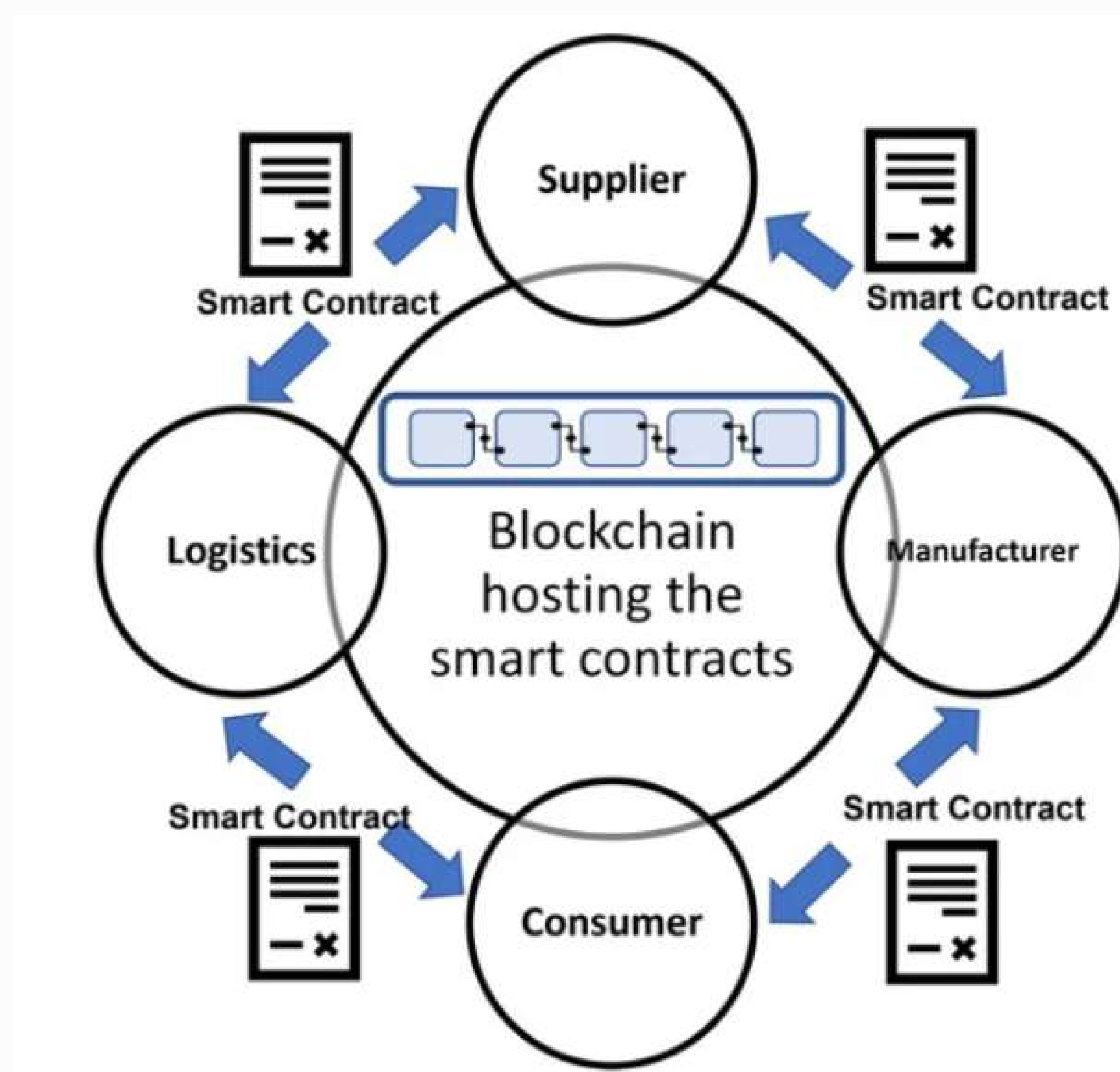
Traceability: From farm to shelf or mine to market, blockchain allows for real-time tracking of goods with a permanent, auditable trail.

Smart Contracts: These programmable agreements automate conditions such as payments or compliance checks, eliminating intermediaries and delays.

Security and Immutability: Transactions recorded on blockchain cannot be altered retroactively, ensuring data integrity and trust.

Sustainability and Ethics: By tracing the origin and journey of materials, blockchain enables companies to verify ethical practices and sustainability claims. While blockchain offers numerous benefits, it's not a replacement for enterprise resource planning (ERP) systems. Instead, it complements them as an "add-on enterprise solution," allowing firms to exchange verified, interoperable data blocks across legacy systems while maintaining operational efficiency and regulatory compliance.

Figure 4: Smart Contracts Enabling Sustainable Supply Chains



Source: <https://www.mdpi.com/2079-9292/12/6/1340>

Historical Funding

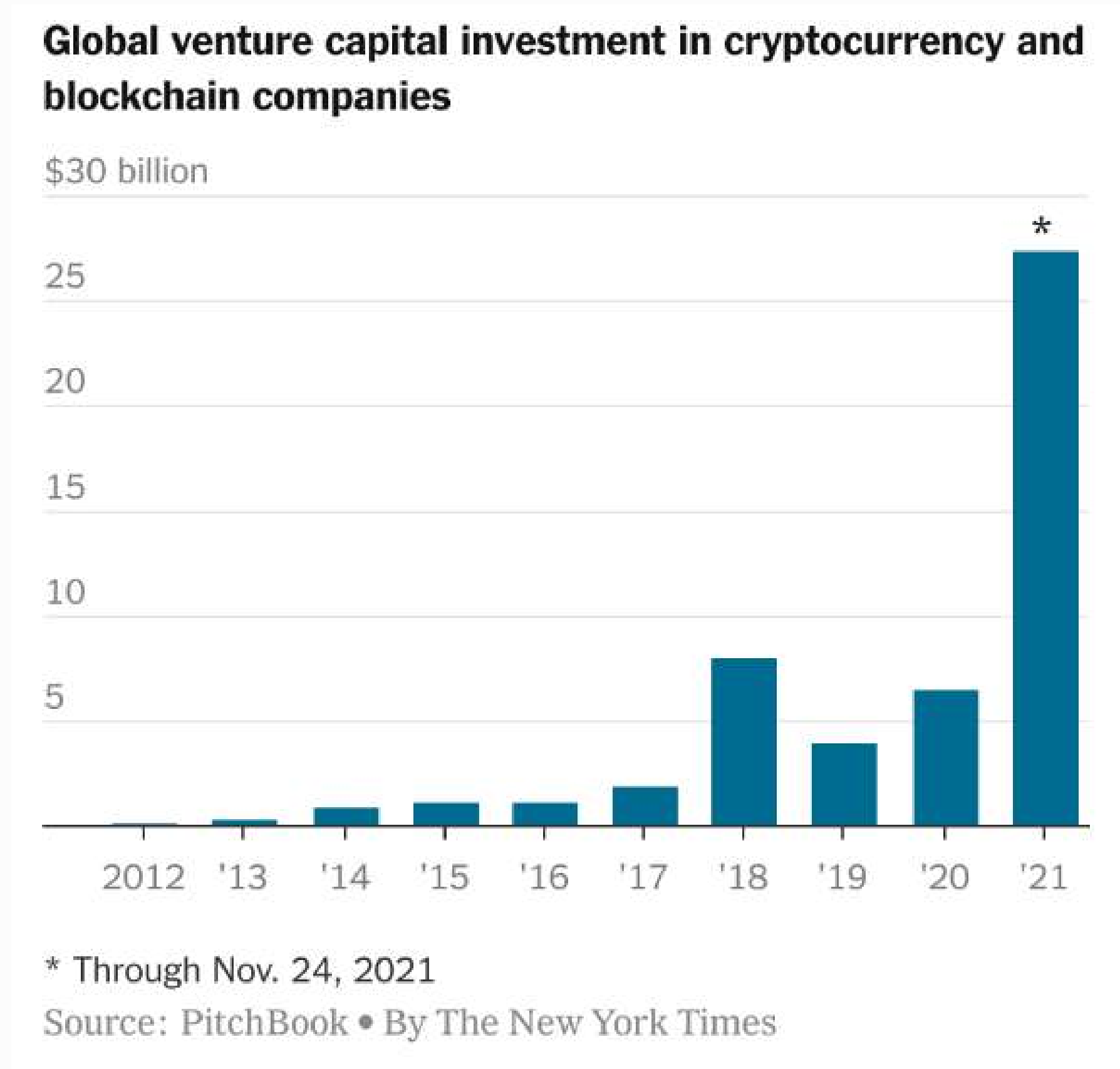


Figure 5: Global VC investment in blockchain and cryptocurrency

1. Evolution of Funding Models

The funding landscape for blockchain-based supply chain projects has evolved significantly, embracing **diverse models to address the complex needs** of this innovative technology. Venture finance remains a cornerstone, with firms like **Andreessen Horowitz, Paradigm, and Polychain Capital** providing not only financial resources but also valuable industry networks and strategic guidance. Simultaneously, institutional investors, including pension funds and sovereign wealth funds, have increasingly participated, signaling broader acceptance of blockchain as a **legitimate infrastructure element**.

Alternative funding mechanisms have emerged alongside traditional venture capital. **Initial Coin Offerings (ICOs)** have allowed startups to raise capital by exchanging digital tokens for cryptocurrencies, though their relatively unregulated status has raised concerns. More regulated alternatives like **Security Token Offerings (STOs)** and **Initial Exchange Offerings (IEOs)** have subsequently developed, enhancing investor security and compliance.

2. Government and Corporate Support

Governments worldwide have recognized blockchain's potential to transform supply chains through targeted initiatives. **Several U.S. states** have established legislative frameworks and research funding, while **China** has launched national blockchain platforms with tax incentives for local startups. These programs not only provide direct funding but also lend legitimacy to projects, **attracting additional private investment**.

Despite market fluctuations, blockchain supply chain businesses worldwide secured approximately **\$2.7 billion across 503 agreements in 2024**.

Major corporations including **Amazon, Walmart, and IBM** have demonstrated renewed confidence in the technology. **IBM's partnership with SyncFab** particularly highlights recognition of blockchain's potential to enhance supply chain accountability and transparency.

3. Success Stories in Funding

Several blockchain startups focused on supply chain applications have successfully secured significant funding:

- **Tilkal**, a French startup founded in **2017** providing supply chain traceability solutions for major agri-food groups, secured **€2.5 million** from the **European Innovation Council Accelerator** and additional funding from Innovacom to expand operations across Europe.
- **WaveBL**, founded in **2017** in Israel, leverages blockchain for secure digital trade document solutions. The company closed a \$37 million financing round in **January 2024**, including a **\$26 million Series B** led by **NewRoad Capital Partners**, with previous backing from ZIM and Contour Venture Partners.
- **Retraced**, established in **2019** in Düsseldorf, helps fashion brands ensure sustainability through blockchain-powered supply chain tracing. Working with brands like **Victoria's Secret** and supporting over 15,000 suppliers worldwide, Retraced recently raised **€15 million in Series A** funding led by **Partech** to advance its AI capabilities and automation.

4. Challenges and Outlook

Despite encouraging trends, blockchain supply chain funding faces persistent challenges. **Regulatory uncertainty** remains significant, as inconsistent frameworks across jurisdictions create ambiguity that **deters traditional investors**. Clear, uniform regulations are essential to attract conventional financing and build investor confidence.

Additionally, **security vulnerabilities** within the blockchain ecosystem, including potential **fraud** and **hacking** risks, have resulted in notable financial losses. These incidents underscore the importance of robust security measures and cybersecurity best practices to address investor concerns.

As the technology matures and these challenges are addressed, funding for blockchain supply chain initiatives is **expected to continue growing**, reflecting the technology's essential role in building more **transparent, efficient, and resilient supply chains for the future**.

Future Trends

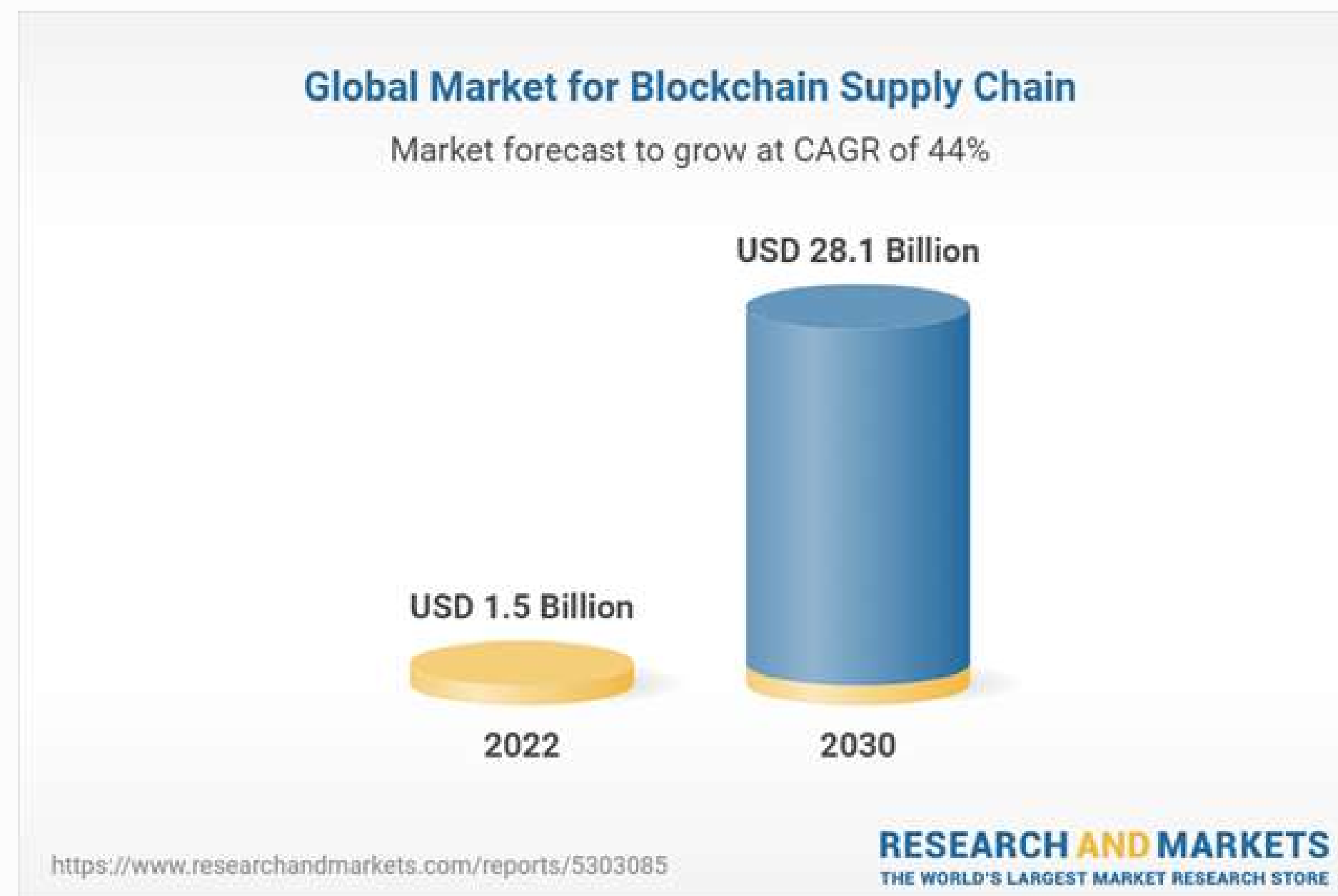


Fig 6: Global Market for Blockchain Supply Chain

1. Growth and Market Expansion

The blockchain industry is positioned for remarkable growth in supply chain management, with market size projections indicating an expansion from **\$1.47 billion to \$75.38 billion** over the next decade. This growth is being driven by increasing demands for **transparency, security, and efficiency** throughout global supply networks.

Major technology providers including **IBM, Oracle, and SAP** are accelerating blockchain integration into their supply chain solutions, leveraging the technology to improve tracking capabilities and optimize logistics operations. The **elimination of intermediaries** and expanded automation made possible through blockchain implementation offer substantial opportunities for market growth across multiple industries.

2. Enhanced Security Measures

With increasing instances of data breaches and cyber-attacks, businesses are prioritizing the **protection of their supply chain data** as a critical defense against potential threats. This heightened focus on security is driving adoption of advanced technologies, including **encryption, multi-factor authentication, and real-time monitoring systems**, ensuring secure transaction processing.

The blockchain industry stands to benefit significantly from this increased emphasis on supply chain security. Market forecasts anticipate **strong growth in blockchain solutions** designed specifically to address these challenges, driven by ongoing technological advancements and growing focus on regulatory compliance.

Companies across various industries are expected to **invest heavily in blockchain infrastructure** to safeguard their operations and ensure transactional safety.

As demand for secure transactions continues to rise, blockchain technology is positioned to play a **central role in reshaping supply chain security frameworks**.

3. Government Support and Regulations

Governments worldwide are recognizing blockchain's potential to improve supply chain **efficiency and compliance**. The European Union has established the **European Blockchain Services Infrastructure (EBSI)** to facilitate cross-border transactions. This initiative demonstrates significant commitment, with the EU allocating **€4 million** for blockchain and AI development in 2021, planning to increase this investment to **€2 billion by 2027**.

This governmental support signals the **strategic importance** of blockchain technology across various sectors, including supply chains, and suggests a **favorable regulatory environment** for continued innovation and adoption.

Transparency and Sustainability

Transparency in supply chains has become a critical concern for both businesses and consumers. There is growing demand for **visibility into product origins and movements**, driven by the need to ensure **ethical sourcing, regulatory compliance**, and **rapid issue resolution**.

Companies are increasingly adopting technologies that provide **real-time tracking and reporting** of goods throughout the supply chain. This trend is accelerating as businesses face growing consumer expectations for **transparency, ethical practices, and sustainability**.

Blockchain technology is becoming essential in proving ethical sourcing and operational efficiency by providing a **secure, immutable ledger** that tracks goods at every stage.

In coming years, broader blockchain adoption is expected in industries such as **food, pharmaceuticals, and luxury goods**. Companies embracing this technology will gain **competitive advantages** by offering verifiable transparency and meeting growing demand for ethical, sustainable products.

Key Risks and Challenges

1. Data Privacy Concerns

Privacy presents a significant challenge to blockchain integration in supply chains, as sharing data on decentralized platforms may expose sensitive business information. Many companies have turned to **private blockchains** as a solution, though these often **lack robust consensus mechanisms**.

Our team interviewed **Karolina**, Software Engineer at **Ledger**, and **Nasreddine**, Blockchain Consultant at **IBM**, first-hand, to gain deeper insights into the risks associated with blockchain integration.

Karolina suggests: *"To solve this problem, companies should work with fully automated supply chains where everything is set by sensors and deterministic input. Or they should work on a public blockchain with privacy layers..."*

She emphasizes the importance of **public blockchains with privacy layers** and questions whether private blockchains meet the criteria for true blockchain technology.

2. Data Integrity Challenges

Blockchain's **immutability** can be a double-edged sword. Incorrect or fraudulent data, once entered, cannot be changed, posing a threat to the **system's reliability**.

Nasreddine explains: *"If at the beginning someone puts wrong data into the blockchain... it's still wrong data..."*

He underscores that **human error**, not technology, is often the root of data integrity issues. Proposed mitigations include **smart contract-based validation proxies** or **external trust layers**.

3. Interoperability Issues

The lack of **universal standards** for data and transaction formats complicates cross-organizational and cross-border blockchain adoption. Bridges that enable **cross-chain interoperability** often combine **on-chain smart contracts** and **off-chain relayers**, but this creates **cost and trust concerns**. Developing **common standards** for performance metrics and risk assessments is essential for enabling scalable blockchain solutions.

4. Environmental Sustainability

Blockchain's energy consumption is a growing concern, especially with Proof of Work-based systems. For example, Bitcoin's energy use (~130 TWh/year) rivals that of mid-sized countries.

Sustainable alternatives include:

- Renewable energy-powered mining
- Transition to Proof of Stake (PoS)
- Hybrid consensus models that balance security and energy efficiency.

Conclusion

While blockchain technology offers immense potential to transform supply chain management through **enhanced transparency, security, and efficiency**, organizations must address key challenges: **interoperability, sustainability, privacy, and data accuracy**.

The **immutability** of blockchain amplifies the risks of human error, necessitating **strong data validation systems**.

To successfully implement blockchain in supply chains, companies should:

- **Develop strategies** for robust data verification
- **Adopt emerging standards** for interoperability
- **Consider environmental impact** in choosing technology
- **Balance privacy with transparency**
- **Monitor evolving regulations**

Organizations that rise to these challenges will be positioned to lead in a future of **secure, transparent, and efficient** supply chain operations.

Our View

Market Assessment

Our analysis identifies blockchain technology as a **transformative force** in supply chain management. By enhancing transparency, traceability, and efficiency through decentralized and secure infrastructure, blockchain **addresses critical pain points across industries**. The technology's **growth trajectory is promising**, with projected financing reaching **\$2.7 billion in 2024**, supported by implementations across logistics, healthcare, and retail sectors.

Value Proposition

Despite implementation hurdles including adaptability challenges, scalability issues, and high initial costs (particularly challenging for smaller enterprises), we believe **blockchain's benefits significantly outweigh these limitations**. The technology delivers substantial ROI through:

- **Enhanced Operational Efficiency:** Streamlining documentation processes and reducing administrative overhead
- **Improved Consumer Trust:** Providing verifiable information about product journeys
- **Reduced Fraud Risk:** Creating immutable transaction logs that prevent unauthorized alterations

Environmental Considerations

A critical factor in our assessment is **blockchain's environmental impact**. Traditional consensus mechanisms like **Proof of Work consume substantial energy**, raising sustainability concerns. However, the shift toward **Proof of Stake** represents a significant improvement, **reducing energy requirements while maintaining system integrity**. This transition makes blockchain implementation more aligned with corporate sustainability goals and regulatory requirements.

Circular Economy Enhancement

Startups like Circularise demonstrate how blockchain can **track and verify recycled materials**, promoting resource reuse while **protecting proprietary data**. This application supports sustainability while **creating new value streams**.

Warehouse Operations Revolution

Companies like **Darwin Drones** with their EYESEE product illustrate the powerful **combination of blockchain and automation technologies**. These industrial drones perform inventory tasks 5-10x faster than humans while providing secure, real-time data through blockchain integration. With major clients including **L'Oréal, Volvo Trucks, and Bayer**, this sector demonstrates **strong enterprise adoption**.

Market Saturation Risks

We identify **market saturation as a developing concern**. Many startups enter this space with **similar value propositions**, as exemplified by French companies Connecting Food and Tilkal. Both provide blockchain-based traceability solutions for the agri-food industry with comparable feature sets. **Differentiation factors typically include implementation approach, security guarantees, and confidentiality protections**. However, these may prove insufficient to prevent market consolidation.

Last-Mile Delivery Integration

Blockchain integration with UAVs (unmanned aerial vehicles) and delivery robots provides **unprecedented transparency and security in the final delivery stage**. Real-time tracking, automated proof-of-delivery, and reduced fraud potential make this a high-potential investment area.

Implementation Challenges

Blockchain's immutability, while ensuring security, presents challenges when addressing incorrect data inputs. This remains one of the most significant hurdles for widespread enterprise adoption. Solutions that **balance immutability with practical error correction mechanisms** will likely command premium valuations.

Conclusion

We view blockchain as a **high-potential investment area for supply chain transformation**. Despite current limitations and an increasingly competitive landscape, the technology delivers measurable value through **enhanced transparency, operational efficiency, and sustainability support**. As standards mature and implementation costs decrease, we expect blockchain to become an **indispensable tool** in modern supply chain management.

The **most promising investment opportunities** will emerge from companies that: **(1)** address the environmental impact through energy-efficient consensus mechanisms, **(2)** offer seamless integration with existing enterprise systems, **(3)** provide clear ROI through operational improvements, and **(4)** maintain sufficient differentiation in increasingly crowded market segments.

For **investors**, the optimal approach is **selective investment** in companies demonstrating **clear competitive advantages and sustainable business models, rather than broad exposure to the sector**. We anticipate significant **market consolidation within 24-36 months** as the technology matures and customer expectations evolve beyond proof-of-concept implementations to enterprise-scale deployments.

News run

Volvo's Battery Passport for Sustainable EV

(WallStreet Journal, 4 June 2024)



Fig 7: Volvo EX90, the company's new electric SUV

Recent news highlights a significant advancement in supply chain transparency with **Volvo Cars launching the world's first electric vehicle (EV) battery passport on its EX90 SUV**, powered by **Circular**. This passport, developed over five to six years with Circular which uses **blockchain technology** to map supply chains, acts as a **first-of-its-kind electronic record** providing end-to-end primary data. It offers detailed information about the battery's raw materials, including cobalt, nickel, graphite, and lithium, their origin and production journey, the embedded carbon footprint of the entire battery pack, and the percentage of recycled content used. This transparency is accessible to EX90 drivers via the Volvo Cars app and a QR code on the door frame, tracing materials from the mine to the individual car. This is described as a **major achievement** that demonstrates battery passports are possible at scale, aiming to **catalyse action across the industry**.

This launch is particularly relevant for venture capital insights into blockchain implementation in supply chains due to the significant regulatory push and market dynamics it reflects. **Battery passports will be mandatory for EVs sold in the European Union from February 2027**, requiring detailed information including origin, carbon footprint, and recycled content. Other global policies also necessitate proof and continuous monitoring of upstream activity. Volvo is introducing this passport almost three years ahead of the EU mandate to be a pioneer.

The source suggests a **rush among automakers** to create these passports, with many potentially finding it hard to meet the 2027 deadline. Implementing this level of transparency requires complex processes, including integrating with supplier systems and auditing, highlighting the challenge and the value of solutions like Circular's.

Circular, in which Volvo has invested, positions itself with advantages like having the largest network of battery value chain suppliers, speed leveraging existing data, and policy expertise. This transparency is seen as crucial for responsible sourcing, improving sustainability, unlocking incentives, mitigating risk, and is becoming a **standard for business**, shining a light into previously opaque parts of the supply chain.

Sabi and Minespider partner on supply chain transparency

(Global Mining Review, 13 November 2024)



Fig 8: African Union Commodities Strategy

Sabi, a technology company providing supply chain infrastructure in sub-Saharan Africa, has announced a strategic partnership with **Minespider**, a technology company offering a traceability platform and digital product passports. This collaboration aims to introduce **blockchain-enabled transparency and ESG compliance** to African commodity supply chains. The partnership specifically focuses on **critical battery minerals destined for OECD markets**, with the goal of setting new standards for ethical sourcing. Ademola Adesina, Co-Founder and President of Sabi, highlighted that bringing transparency to ESG standards and traceability in mining and trading operations is crucial to ensure source communities benefit from the increasing demand for critical minerals needed for widespread electrification.

Sabi's approach in this partnership is **ESG-guided**, meticulously tracking each product's journey from origin to export and integrating data on various environmental, social, climate, nature, and human rights impacts. This framework incorporates compliance with local laws, Sabi's own ESG policies, and global standards such as OECD, Fairtrade, and Fairmined, supported by independent audits.

Minespider's technology facilitates this through its traceability platform and the creation of **QR-coded digital product passports**. Nathan Williams, Founder and CEO of Minespider, noted that implementing their platform will help make the origin and journey of minerals trustworthy and communicate essential ESG data often required by international regulations.

The initiative seeks to **destigmatis** **African supply chains** for minerals like lithium, copper, and Monazite, as well as agricultural goods such as cocoa and cashew, by providing transparency and proof of compliance.

Blockchain in healthcare adoption faces headwinds in Europe

(Forbes, 30 April 2025)



Fig 9: European Union on Healthcare

The adoption of blockchain technology in Europe is facing significant headwinds, particularly within sectors like healthcare, which are not historically early adopters of innovation.

The challenges stem from several key areas, including a **complex and slow-moving regulatory environment**, where regulations like MiCA, while providing some clarity, can create high compliance burdens and legal ambiguity for emerging blockchain applications like DeFi, NFTs, and DAOs. Another major hurdle is **market fragmentation**, with a patchwork of differing national strategies across Europe that makes achieving interoperability and scalability for pan-European blockchain projects difficult. This is further compounded by a pervasive **institutional skepticism**, as both public and private entities in Europe tend to be more conservative and may view blockchain as speculative, influenced by negative media portrayals of cryptocurrency volatility and scams.

Despite these difficulties, the source suggests that there is potential for progress. Initiatives are being developed, such as the **European Blockchain Services Infrastructure (EBSI)**, which aims to build cross-border public services using blockchain and could serve to demonstrate its practical utility beyond just digital assets. Moreover, a potential **generational shift in leadership**, coupled with increasing pressure to digitize services and greater collaboration between technology hubs, could gradually foster a more blockchain-friendly environment in the future.

Ultimately, Europe is depicted as being at a **crossroads**, needing to decide whether to continue with a cautious approach or to take bold steps to embrace the potentially transformative capabilities of blockchain technology.

South Africa: Blockchain and smart contracts to transform agriculture

(Zawya, 9 April 2025)



Fig 10: Africa's Agricultural Industry

Blockchain and smart contracts are seen as technologies set to transform the **agricultural sector in South Africa**. Experts like **Cobus de Bruyn** and **Adele Jones from Nedbank** explain that blockchain creates a network with memory where all participants have a unique address and interactions are covered by cryptography, providing an audit trail. This technology enhances transactions by making them faster, more cost-effective, and secure, with improved transparency and traceability. **Smart contracts** are essentially code that executes on this network, acting as self-executing digital agreements that automate interactions when predefined conditions are met. This automation can significantly reduce **operational expenses, minimise errors, and build trust** among the parties involved.

This technology offers substantial value to agriculture, a sector already open to adopting new technologies. Specific applications include **streamlining cumbersome import and export processes** by automating complex negotiations and verifications, leading to faster and more secure transactions. Smart contracts also facilitate and **automate payment solutions** in agricultural trade, driving innovation. From a banking perspective, they can expedite the credit approval process, automating steps like issuing facility letters and registering securities, which traditionally require significant manual effort. The source also addresses environmental concerns, clarifying that while some blockchain networks like Bitcoin use a lot of power, other solutions, including the one Nedbank is exploring, have modest energy requirements and can achieve significant energy reductions.

Furthermore, blockchain provides a simple way to manage and **tokenise carbon credits**, offering **potential tax benefits for farmers**. While the technology is new and represents massive opportunities, its widespread use in South Africa is noted as not yet prevalent. These developments are part of the broader shift towards Web 3.0, which aims to replace the current internet infrastructure and provide clients with fast, frictionless, and cost-effective solutions.

Tracr and Sarine Technologies Sign Agreement for Pioneering Diamond Traceability Solution

(De Beers Group, 25 February 2025)



Fig 11: Process of cutting diamonds

Tracr, a distributed diamond blockchain platform, and **Sarine Technologies**, a leader in precision technologies for the diamond industry, have signed a collaboration agreement to create a pioneering, **scalable, and cost-effective diamond traceability solution**.

This collaboration aims to enhance transparency and trust across the supply chain. The solution leverages Tracr's blockchain technology, Sarine's diamond scanning solutions, and sophisticated diamond identification and matching algorithms to enable **algorithmic matching of diamonds at scale from the source**. By integrating Tracr's platform and Sarine's cloud, the agreement facilitates the seamless matching of diamond data across different stages of a diamond's journey, reducing the need for duplicate processes for participants.

A key benefit of this arrangement is the provision of **objective verification for a diamond's journey** from rough stone produced by a miner to polished stone manufactured downstream, using verifiable diamond scanning information. This robust algorithmic matching process enhances provenance assurance for participating businesses, diamond brands, and consumers.

Participants can register their diamonds' data, including scans, to the Tracr platform via Sarine software, allowing the data to be algorithmically checked against existing records for objective verification. The solution is built on existing, widely-used infrastructure, which is expected to facilitate quick and effective scaling with minimal impact on participants' supply chains. This enhanced **traceability** and provenance **assurance** capability supports rapidly evolving consumer expectations and the fast-changing regulatory landscape, such as functioning as a potential customs service in line with requirements like the **G7 Diamond Protocol**

APPENDIX:

• Sources:

a) Brief summary

- <https://www.grandviewresearch.com/industry-analysis/blockchain-supply-chain-market-report>
- <https://analysis.technavio.org/report/blockchain-supply-chain-market>
- <https://www.reuters.com/sustainability/cop/eu-changes-sustainability-law-risk-company-lawsuits-legal-scholars-say-2025-05-09/>
- <https://www.grandviewresearch.com/industry-analysis/blockchain-supply-chain-market-report>

b) Sectors implementing blockchain in supply chain

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