RESEARCH PAPER

Blockchain in Supply Chain

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Globalization, shifting cultural and socioeconomic structures, sustainability influences, and new technologies are increasing supply chain complexity. Effective and efficient network management and goods distribution are critical to maintaining organizational competitiveness.

A supply chain can span many vertical stages; hundreds of horizontal relationships; multiple geographical locations; diverse financial systems and payment structures; numerous individual personalities and entities; and varying temporal pressures, depending on the product and market. Continuous improvement is necessary in order to successfully manage these dimensions.

Although technology alone cannot solve all supply chain concerns, many organizations have turned to new tools such as blockchain to help them achieve this goal. Blockchain's promise and hype are difficult to parse. An optimistic perspective seems to have taken hold over the past few years, although judiciousness in capabilities, as with all technologies, has also become prominent. Proponents of blockchain in supply chain argue that increases in efficiency and transparency can positively influence several activities, including

- reliability and integrity
- transparency
- auditability and security
- management of material flows
- innovation
- inventory management
- warehousing management
- products and services design
- delivery
- payment.

Worcester Polytechnic Institute, with the assistance of ASCM research funding, conducted research to analyze whether the promise of blockchain is effective in practice. Survey respondents include 197 supply chain professionals across various functions. Most of the sample (48%) were at the managerial level — 13% directors and 9% vice presidents or executive C-suite.

The survey sought to discover blockchain motivators and barriers. For motivators, supply chain and market pressures seem to be the biggest stimulus. Additional drivers include information traceability, information security and cost savings. Table 1 summarizes the top three reasons companies are motivated to adopt blockchain.

Table 1: Why do companies adopt blockchain?

Motivators	1. The need to collaborate with supply chain partners 2. Customer pressure 3. Market pressures
Material	1. Enhanced information security 2. Reduced operations cost 3. Better information traceability

For barriers, survey results identified four major groupings: organizational, supply chain, technological, and external. Internatlly, organizational expertise and support mechanisms were identified as the biggest impediments. Customer awareness and the need for supplier collaboration and coordination were also major obstructions. Table 2 identifies the top three reasons for each of the identified categories.

Table 2: Barriers to adopting blockchain technology

Organizational	1. Lack of technological expertise 2. Lack of tools for blockchain implementation 3. Lack of benchmarking data on implementation
Supply chain	1. Lack of customer awareness about blockchain technology 2. Lack of supply chain partner collaboration 3. Lack of supply chain partner coordination
Technological	1. Immaturity of the technology 2. Limited information technology infrastructure 3. Security concerns
External	1. Market uncertainty about using blockchain 2. Lack of industry involvement in adopting blockchain 3. Lack of involvement of related communities adopting blockchain

Although blockchain may have passed beyond the classification of emerging trend, there is still novelty to the technology and its application to supply chains. No matter the company size, a vast majority of organizations (65%) have not implemented any type of project or are not considering it. Twenty-six percent say they are in the planning stages, with no actual implementation in progress.

Interestingly, companies with fewer than 1,000 employees are doing more with blockchain implementation. These may be more entrepreneurial businesses or those whose leaders are willing to take initiatives and that are not very costly to complete. Also, blockchain can expedite more economical product launches and transactional services for small and medium-sized enterprises (SMEs) because the technology typically requires fewer resources at such organizations compared to their larger peers. In addition, blockchain and smart contracts can help SMEs inexpensively streamline flows to create, check and enforce contracts for transactional activities such as paying employees and bills, creating insurance policies, and handling inventory fulfillment.

Other than economic advantages, security and transparency driven from adopting blockchain can also prove to be value-added benefits for SMEs. They may no longer need to shoulder the risk of handling large amounts of personal data. Alternatively, these results show that no very large companies (over 25,000 employees) have any fully implemented projects. We conjecture, that larger companies in our data set may view this technology as more risky, disruptive, does not fit in well with legacy system, and thus be unwilling to fully implement any specific blockchain technology.

Blockchain's novelty, along with a general lack of understanding about its capabilities, make it a risky proposition for supply chains. However, blockchain is likely to evolve rapidly as more industry professionals learn about the game-changing technology and its ability to solve problems while helping their networks becoming more efficient and effective.

ABOUT ASCM

The Association for Supply Chain Management (ASCM) is the global leader in supply chain organizational transformation, innovation and leadership. As the largest nonprofit association for supply chain, ASCM is an unbiased partner, connecting companies around the world to the newest thought leadership on all aspects of supply chain. ASCM is built on a foundation of APICS certification and training spanning 60 years. Now, ASCM is driving innovation in the industry with new products, services and partnerships that enable companies to further optimize their supply chains, secure their competitive advantage and positively influence their bottom lines.
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