Solution for tracking and tracing in supply chain

The concept of track and trace in the supply chain market focuses on the ability of the supply chain stakeholders to track and trace products and their movements from the point of origin to the point of sale. This process involves capturing and recording information about the products as they traverse through the supply chain end to end, including details such as their location of manufacture, transportation details, and information regarding centres or people who handled them along the way and their real-time location. The main objective of track and trace is to improve end-to-end transparency, provide real-time visibility into the supply chain and enable companies to swiftly identify and address issues such as delays, disruptions or fraud. Efficient implementation of this concept can help in improving efficiency, transparency, security and customer satisfaction while reducing cost, fraud and mismanagement in the supply chain market.

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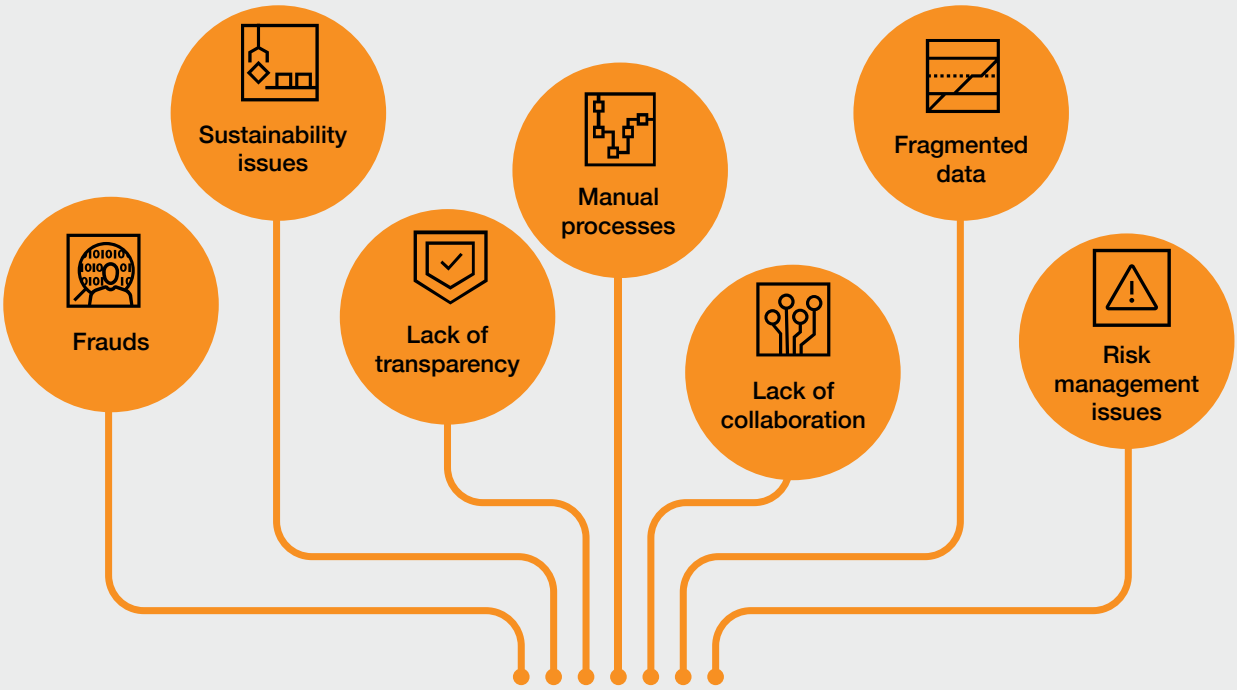
Challenges

Supply chain market problems



Supply chain market problems

Despite advancements in modern technology, issues such as paper-based documentation use, manual tracking and monitoring, inefficient spreadsheets and databases result in limited visibility due to the lack of real-time data and insights. Some of these issues have been highlighted below:

1. **Lack of transparency:** Many companies struggle to maintain transparency throughout their supply chain due to the complexity of their operations and the involvement of multiple stakeholders. This can lead to issues such as fraud, resource wastage and delays.
2. **Manual processes:** Many supply chain processes and procedures are still manual, requiring significant time and resources to manage. Therefore, possibilities of delays, errors and greater costs are high.
3. **Lack of collaboration:** Seamless collaboration between different stakeholders in the supply chain is often lacking, leading to communication breakdowns and inefficiencies.
4. **Fragmented data:** Data fragmentation is a prominent issue affecting the supply chain market. Since data fragmentation involves the storage of data in multiple locations across distinct systems or departments, the chances of errors in data sharing or access across the supply chain are high.
5. **Risk management issues:** Supply chains are vulnerable to a range of risks like natural disasters, cyberattacks and geopolitical events. Companies often struggle to manage these risks effectively, leading to disruptions and delays.
6. **Frauds:** Today's supply chain markets are also susceptible to various types of frauds, some of which have been highlighted later in this article.
7. **Sustainability issues:** Sustainability is an increasingly important concern in the supply chain market as consumers and regulators demand greater accountability for the environmental and social impact of a supply chain. Many companies struggle to implement sustainable practices across their supply chain due to a lack of resources, knowledge or incentives.

Overall, these problems highlight the need for greater transparency, collaboration and automation in the supply chain market.

Frauds in supply chain

Some of the common types of frauds in supply chains include the following:

1. **Counterfeit products:** Counterfeit products are major problems in modern supply chains. Such products are often made to look legitimate but are inauthentic and of lower quality. Counterfeit products can cause financial harm to consumers and cause reputational damage to brands.
2. **Invoice fraud:** Invoice fraud is where suppliers submit fraudulent invoices to companies. These invoices may contain inflated prices or charges for goods that were never delivered.
3. **Theft:** Theft is a common problem in supply chains. This can include theft of goods in transit, or by employees or suppliers.
4. **Smuggling:** Smuggling involves illegally importing goods into a country to avoid paying taxes or to bypass regulations.
5. **Corruption:** Corruption is a major problem in the supply chain, particularly in developing countries. This can include bribery of government officials or employees of companies involved in the supply chain.

As per the Global Economic Survey 2022 conducted by PwC regarding crime and fraud, one out of eight organisations experienced a new incident of supply chain fraud due to the disruptions caused during COVID-19.[1] One out of five companies consider supply chain fraud as an area of increased risk as a result of the pandemic.[2] Few companies are aware of the true magnitude of the threats posed by fraud and misconduct risks within their supply chain, making this an area requiring thorough understanding both at present and in future.

According to the Global Annual CEO Survey conducted by PwC, almost 50% of the surveyed CEOs have expressed concern regarding disruptions in supply chains.[3] Approximately 67% of the surveyed CEOs have even started to make adjustments in their supply chains.[4] It is important for companies to take steps to prevent and detect fraud in their supply chains. Implementing supply chain transparency and traceability measures, conducting due diligence on suppliers, and using technologies such as blockchain to improve the security and transparency of the supply chain can be beneficial in this context.

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1 PwC Global Economic Crime and Fraud Survey. (2022) https://www.pwc.com/gx/en/forensics/gecsm-2022/PwC-Global-Economic-Crime-and-Fraud-Survey-2022.pdf

2 PwC Global Economic Crime and Fraud Survey. (2022) https://www.pwc.com/gx/en/forensics/gecsm-2022/PwC-Global-Economic-Crime-and-Fraud-Survey-2022.pdf

3 PwC - Paradigm Shift in Supply Chain Management. (2023) https://www.pwc.in/assets/pdfs/research-insights-hub/immersive-outlook-3/paradigm-shift-in-supply-chain-management.pdf

4 PwC - Paradigm Shift in Supply Chain Management. (2023) https://www.pwc.in/assets/pdfs/research-insights-hub/immersive-outlook-3/paradigm-shift-in-supply-chain-management.pdf

Benefits of blockchain in the supply chain market

Blockchain can be very useful in various ways in the supply chain market today. Its advantages include:

1. **Traceability:** Blockchain can be used to create a tamper-proof and transparent record of all transactions in the supply chain, including the movement of goods, payments and contracts. This can improve visibility, making it easier to track products from the point of origin to the point of sale.
2. **Authentication:** Blockchain can be used to authenticate products and prevent counterfeiting by providing a secure and immutable record of product ownership and origin.
3. **Smart contracts:** Blockchain can be used to automate contractual agreements between parties in the supply chain, reducing the need for intermediaries and improving the overall efficiency of the supply chain.
4. **Payment processing:** Blockchain can be used to automate payment processing and reduce the risk of fraud and errors in financial transactions.
5. **Risk management:** Blockchain can be utilised to manage risk in the supply chain by providing real-time visibility into operations and enabling companies to quickly identify and respond to potential issues.
6. **Data sharing:** Blockchain can be used to securely and transparently share data across the supply chain, improving collaboration and communication between parties and stakeholders.
7. **Environmental sustainability:** Blockchain can be used to track the environmental impact of products and improve sustainability in the supply chain by providing a transparent record of carbon emissions and other environmental factors.

Overall, blockchain can help in improving efficiency, transparency and security in the supply chain market. This, in turn, can lead to better management of operations, improved customer satisfaction and reduced costs.

Combining centralised and decentralised tech for supply chain management

Centralised supply chain management involves a single entity or organisation controlling the supply chain from end to end. While this can be efficient in terms of cost and coordination, issues of trust and transparency can also arise – especially when multiple parties are involved. Decentralised supply chain management, on the other hand, involves the collaboration of multiple entities or organisations to manage the supply chain. This can improve transparency and trust but can also lead to issues with coordination and efficiency.

Benefits of combining centralised and decentralised approaches

By combining centralised and decentralised approaches, companies can utilise the benefits offered by both of these approaches while minimising their drawbacks.

1. **Improved transparency:** Decentralised technologies such as blockchain can improve transparency by creating a tamper-proof record of all transactions. A centralised platform can then be used to aggregate and analyse this data to provide real-time insights into supply chain operations.
2. **Greater efficiency:** The management of the overall supply chain can be handled by a centralised platform. Decentralised technologies, on the other hand, can help with the automation of multiple processes like shipping and payment management. This reduces the need for intermediaries.
3. **Better risk management:** A centralised platform can be utilised for managing risks across the supply chain. Simultaneously, decentralised technologies can provide greater transparency and traceability, making it easier to identify potential issues and take actions for mitigating them.
4. **Enhanced collaboration:** While decentralised technologies are efficient in enabling supply chain stakeholder collaboration, a centralised platform provides a singular point of access for communication and data.
5. **Greater agility:** The combination of decentralised and centralised approaches can provide greater agility in the supply chain, thereby allowing companies to adapt quickly to demand, supply and market conditions.

How PwC can help

PwC has developed an application for tracking and tracing products through the supply chain by combining centralised and decentralised supply chain management technologies. This can be beneficial for companies in balancing the benefits of control and efficiency with those of transparency and collaboration. This can subsequently lead to better supply chain management in the long run. The tracking of the product lifecycle on an end-to-end basis, starting from the point of its manufacture to the point where it reaches the customer, is achievable through the developed solution. Data is stored in both blockchain and centralised databases. This makes the system tamper-proof and easily accessible to the authorised users.

The solution utilises unique order token IDs for the manufactured products. All information related to the tracking and tracing of products is stored on the same block of the blockchain in the form of transactions. Transaction record-viewing is possible through the scanning of two dedicated unique QR codes. While one QR code is for adding the transaction, another is for viewing the successfully completed and recorded transactions. Details like the date and time of transaction, location and messages related to the transaction, and people initiating and receiving the transactions can be viewed through this application.

Solution workflow

01 Product creation by manufacturers

02 Token creation and association with product

03 Token assignment to distributors

04 Distributor confirmation of product obtainment through QR code scanning

05 Token assignment to retailers

06 Product delivery to retailers

07 Retailer confirmation of product obtainment through QR code scanning

08 Customer purchase of product and QR code scanning

In addition, this solution can easily be integrated with manufacturing systems. Manufacturing systems manage business processes and facilitate the flow of information across organisations. The integration of PwC's solution with manufacturing systems can enhance its usability by companies and make it flexible enough for use at various parts of the supply chain in real time. On integrating it with enterprise resource planning platforms capable of managing multiple everyday business activities, the solution enhances aspects like the timely management of orders.

Integrating manufacturing systems with blockchain involves setting up a connection between the two systems, allowing them to share data and transactions. The steps for integrating manufacturing systems with blockchain in the context of our solution include:

1. Identification of the business process or use case requiring integration with blockchain – this could be anything from supply chain management to financial transactions.
2. Choosing a blockchain platform compatible with a manufacturing system is essential for the success of the integration process.
3. Development of smart contracts or blockchain applications that are to interact with the manufacturing system – since smart contracts are self-executing programmes running on a blockchain, the automation of transactions and business processes can be easily achieved.
4. Connecting the app to the blockchain platform using an API or middleware – allows the two systems to communicate and exchange data.

The solution's user-friendly access control features along with the frequently updated dashboard analytics provide useful, easily understandable and important insights to its users. The low-cost solution provides the exact location of transactions throughout the supply chain. Immutable storage of data ensures data security and makes all steps of the supply chain verifiable and trackable. Mobile-accessible features for carrying out the transactions make the entire application much more versatile and extends its reach to multiple stakeholders. As a result, issues like counterfeit products, invoice fraud, theft and smuggling can be mitigated appropriately.

About PwC

At PwC, our purpose is to build trust in society and solve important problems. We're a network of firms in 152 countries with over 328,000 people who are committed to delivering quality in assurance, advisory and tax services. Find out more and tell us what matters to you by visiting us at www.pwc.com.

PwC refers to the PwC network and/or one or more of its member firms, each of which is a separate legal entity. Please see www.pwc.com/structure for further details.

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