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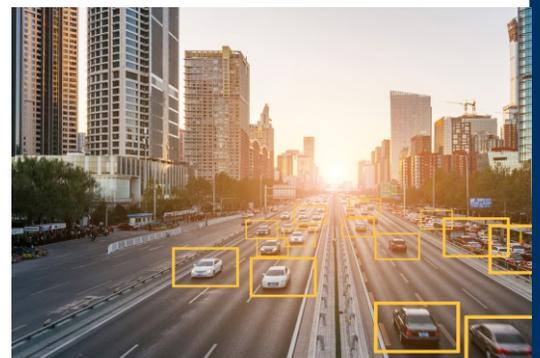
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## TRACEABILITY - AN OVERVIEW

**B**usinesses have achieved success in a globalised world on the back of highly efficient supply chains wherein goods produced in one part of the world could be transported to markets around the world. All that changed when COVID-19 struck resulting into closure of borders, and a lack of visibility in the supply chains from the manufacturers to the consumers. Suddenly, resilience became much more important than efficiency.

Moreover, the change in consumer behaviour require flexibility and speed. And other stakeholders, including governments, NGOs, and investors, expect companies to produce sustainable products and services, which require refurbishment and reuse of the products.

Finally, a changing global world order requires supply chains to be designed in such a way that there is an end-to-end transparency and visibility of product flow to all stakeholders in the supply chain.

Traceability enables companies to obtain exact information on their products, raw materials and suppliers and track the movement of goods along the value chain from factory to the end consumer. In turn, traceability expedites progress towards sustainable outcomes, enhances business performance, and elevates competitiveness.

Traceability can offer various advantages to companies, such as improving efficiency, complying with regulations and standards, managing risks, and building stronger partnerships.

The COVID-19 pandemic has accelerated the adoption and evolution of traceability, emphasising the importance of supply chain visibility, sustainability, and resilience. The pandemic has driven the adoption of new technologies and a shift towards more localised and agile supply chains, making traceability a critical tool for companies looking to meet evolving consumer and regulatory demands.



## FIVE MAJOR FACTORS DRIVE THE ADOPTION OF TRACEABILITY

**T**raceability is becoming increasingly important for companies to manage their supply chains effectively and meet regulatory requirements. In many industries, traceability is mandatory, and companies that fail to implement effective traceability systems may face penalties or legal consequences. Moreover, consumers are becoming more conscious of the products they buy, and they want to know where their products come from, how they are produced, and their impact on the environment. The increasing digitisation of business processes also drives the need for effective traceability systems to ensure transparency and visibility across supply chains. As a result, companies can gain a competitive advantage in the marketplace using traceability.



### **Increasing government regulations**

Increasing government regulations to ensure product safety and sustainable

business practices drive the need for traceability systems. Governments find traceability an effective means to ensure compliance with laws and standards, such as in food safety or environmental regulations, or to provide guidance on recalls. In addition, businesses must comply and adapt to constantly changing rules across different jurisdictions and must align with the local laws as they expand their supply chains globally. Traceability would greatly aid these businesses in doing so.

Implementing an efficient traceability system is mandated by regulatory and industry requirements across the globe to ensure food safety. These regulations include a recall procedure for unsafe food products, which requires removal from all food chain stages and information dissemination to concerned consumers. Food manufacturers must introduce a traceability system in their processes to comply with these laws and regulations.<sup>1</sup>

<sup>1</sup> [https://fssai.gov.in/upload/uploadfiles/files/Report\\_Intern\\_Shelina\\_04\\_10\\_2019.pdf](https://fssai.gov.in/upload/uploadfiles/files/Report_Intern_Shelina_04_10_2019.pdf)

## FIVE MAJOR FACTORS DRIVE THE ADOPTION OF TRACEABILITY



The healthcare sector is also experiencing an emerging global demand for traceability due to regulatory requirements. For instance, Hikma Pharmaceuticals, a global pharmaceutical generics market player, needed a track and trace system for its full line of pharmaceuticals that could scale across its global regions in response to emerging regulatory requirements. As a result, the company implemented GS1 standards to uniquely identify medicines at the individual dosage level. By scanning these barcodes, Hikma can now capture information for traceability in its IT systems, from its plants to healthcare providers and patient bedsides.<sup>2</sup>



### Shifting consumer preferences

Every business aims to identify and bridge consumer demand gaps to the best possible extent with its solutions and offerings. An increase in consumer awareness regarding the products they purchase and use has led to a demand for

greater transparency and visibility about these products to better understand the potential risks associated with developments in the supply chain.<sup>3</sup>

According to Mintel's 2022 research, 49% of Indian customers read product labels before making a purchase, and 35% are interested in food and beverage innovations that can be traced online from source to store. Also, 42% of Indians firmly agree that customers would be loyal to firms that provide transparency to their customers.<sup>4</sup>

EY's Future Consumer Index 2022 has shown that 43% of global consumers are open to paying a premium for products and services from companies that positively impact society.

Additionally, as much as 61% of consumers seek greater transparency on the sustainability of their products. They are willing to pay a premium for products that provide such information.<sup>5</sup> Therefore, companies must be able to track their packaging wastes and emissions to align with their customer's evolving demands

<sup>2</sup> <https://www.gs1.org/standards/traceability/case-study-library>

<sup>3</sup> <https://www.gs1.org/standards/traceability>

<sup>4</sup> <https://www.mintel.com/food-and-drink-market-news/three-brand-transparency-strategies-for-food-and-drink/>

<sup>5</sup> [https://www.ey.com/en\\_dk/consulting/sustainability-and-traceability-will-be-a-future-competitive-advantage](https://www.ey.com/en_dk/consulting/sustainability-and-traceability-will-be-a-future-competitive-advantage)

## FIVE MAJOR FACTORS DRIVE THE ADOPTION OF TRACEABILITY

and eco-friendly alternatives to meet sustainability requirements.

Companies are implementing traceability measures to meet consumer demand for increased product transparency. For example, Woolworths, Australia's largest supermarket chain, adopted GS1-compliant 2D barcodes to provide detailed product data without causing confusion or wasting label space, meeting new shopper expectations and supplier challenges. 2D barcodes enable Woolworths to enhance food safety and reduce food waste by up to 40% while unlocking new capabilities and improving efficiencies for the retailer and suppliers. With this technology, retailers can manage inventory more specifically, alert cashiers for expired products, and provide product information to the consumers.<sup>6</sup>



### Growing supply chain risks

Although supply chains have become more intricate in recent years, they have become more vulnerable to threats, disruptions, and instability. For example, the Business

Continuity Institute (BCI) 2021 report found that 27.8% of organisations surveyed globally (n=173) reported over 20 supply chain disruptions in 2020, starkly contrasting to 2019, where only 4.8% reported the same number.<sup>7</sup>

Therefore, it is imperative to rethink supply chain management, especially in leveraging technology and the benefits of digitalisation to bring about traceability solutions that enable businesses to anticipate and monitor events in real-time, reducing the probability of future disruptions from greater visibility into supply chains.<sup>8</sup>

Companies are leveraging traceability to increase visibility and transparency in their supply chains. For instance, Manbulloo, Australia's largest mango grower, wanted to improve information flow in its supply chain by enhancing communication and business operations with ripeners and customers. They implemented GS1 serialised barcodes on tray labels for the unique identification of products, enabling tracking of every tray on every pallet from seven farms and five-pack houses. FreshTrack Systems' application collects traceability information uploaded in real-



<sup>6</sup> <https://www.gs1.org/standards/traceability/case-study-library>

<sup>7</sup> <https://www.thebci.org/static/e02a3e5f-82e5-4ff1-b8bc61de9657e9c8/BCI-0007h-Supply-Chain-Resilience-ReportLow-Singles.pdf>

<sup>8</sup> <https://www.tandfonline.com/doi/full/10.1080/09537287.2021.198366>

## FIVE MAJOR FACTORS DRIVE THE ADOPTION OF TRACEABILITY



time to the Trust Provenance blockchain system without performance loss. With GS1 standards and technology solutions, Manbulloo tracks every carton and batch from packing to retail, reducing order rejections and enhancing data management to improve mango quality and integrity.<sup>9</sup>



### Deepening digital penetration

As digital penetration continues to deepen worldwide, almost all sectors are seizing this opportunity by integrating digital technologies into their supply chain management for improved outcomes. Technologies such as barcodes, QR codes, blockchain, IoT devices, and cloud computing are rapidly infiltrating the traceability system, enabling companies to identify strategic value chain opportunities, accelerate innovation, mitigate the impact of internal and external disruptions, and certify sustainable processes and products.

COVID-19 and trade tensions have highlighted the importance of traceability

for sustainability, and digital-companies focusing solely on sustainability or digital need to incorporate traceability to achieve the highest return on investment.

As per BCI's Supply Chain Resilience Report 2021, over half (55.6%) of organisations surveyed globally (n=173) have started utilising technology to analyse and report supply chain disruptions, with a significant increase in the number of organisations (40.5%) using technology for supply chain mapping, up from 22.6% in 2019. Moreover, 57.6% of organisations attribute their investment in new technology and tools to the impact of COVID-19.<sup>10</sup>



### Intensifying competition

In the new retail landscape, being "Digital First" is essential for survival, and both offline and online retailers are adopting technology to remain competitive. The retail industry is experiencing the entry of new players such as JioMart. Modern retailers are embracing an omnichannel approach to expand their profitability and

<sup>9</sup> <https://www.gs1.org/standards/traceability/case-study-library>

<sup>10</sup> <https://www.thebci.org/static/e02a3e5f-82e5-4ff1-b8bc61de9657e9c8/BCI-0007h-Supply-Chain-Resilience-ReportLow-Singles.pdf>

## FIVE MAJOR FACTORS DRIVE THE ADOPTION OF TRACEABILITY

reach. In addition, concepts like ONDC (Open Network for Digital Commerce) enable millions of small retailers to participate in digital commerce.

Additionally, consumer packaged goods companies are exploring direct-to-consumer (D2C) offerings opportunities through collaborations with delivery startups.<sup>11</sup> Amidst heated competition, large FMCG companies like Dabur are considering acquisitions to expand in the market.<sup>12</sup>

The healthcare delivery paradigm is also transforming and on the brink of significant advancement. There is a heightened emphasis on healthcare and drug innovation. The COVID-19 pandemic has highlighted the need for healthcare organisations to enhance their resilience, flexibility, and innovation by adopting digitally driven business models that

prioritise data. As the healthcare industry grows, the demand for medical products, devices, and equipment also increases. However, the complexity of the healthcare supply chain makes it challenging to ensure the safety, quality, and authenticity of products.<sup>13</sup>

In such a competitive market, traceability provides businesses with a significant competitive advantage by enhancing supply chain transparency and increasing consumer confidence in the safety and authenticity of their products. By effectively tracking their products and monitoring their journey through the supply chain from the point of origin to the end of consumption, businesses can remain competitive, comply with regulations, and increase consumer trust in their products. Thus, intensifying competition has increased the need for companies to implement traceability measures.



<sup>11</sup> <https://www.businessoutreach.in/competition-intensifying-in-e-grocery-sector-to-become-users-next-pados-ki-dukan/>, <https://www.indiaretailing.com/2023/01/28/news-the-demand-for-experiential-retail-to-grow-in-2023/>

<sup>12</sup> [https://www.business-standard.com/article/companies/dabur-weighs-acquisitions-to-expand-across-india-se-asia-amid-competition-123021400121\\_1.html](https://www.business-standard.com/article/companies/dabur-weighs-acquisitions-to-expand-across-india-se-asia-amid-competition-123021400121_1.html)

<sup>13</sup> [https://www.ey.com/en\\_in/health/healthcare-in-india-2022-and-beyond](https://www.ey.com/en_in/health/healthcare-in-india-2022-and-beyond)

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## TRACEABILITY PLAYS A CRUCIAL ROLE ACROSS MULTIPLE SECTORS

**T**raceability is a sector-agnostic concept, offering to deliver benefits across industries. Regardless of the product or service type, traceability enables companies to track items through the supply chain, providing visibility and transparency. From food and agriculture to healthcare, manufacturing, and logistics, traceability is essential to ensuring efficiency, reducing risks, and building customer trust. As the world becomes more interconnected and reliant on digital systems, traceability will become crucial to managing supply chains effectively.



### FMCG Industry

Traceability plays a crucial role in FMCG industry because of relatively short product shelf life. At the same time, customers benefit from being informed about products thanks to serialization, traceability, and food safety-related information.

Traceability solutions also ensure better control of manufacturing processes, supply chain processes, and effective food safety management.<sup>11</sup> It also contributes to the FMCG industry by providing food safety, quality control, supply chain visibility, regulatory compliance, and improved inventory management.<sup>14</sup>

According to the TraceX Technologies report, the US experienced an E-coli (Escherichia coli - bacteria) outbreak in 2020 spanning 19 states, which resulted in the hospitalisation of 20 individuals. The outbreak's source was traced back to leafy greens within the US, requiring considerable financial resources for tracking and informing the public about the incident. To address such challenges, Walmart leveraged its blockchain technology solutions to digitise its food supply chains, enabling them to identify contaminated lots within seconds, which previously took a manual process of one week.<sup>15</sup>

<sup>14</sup> <https://www.macsa.com/en/blog-en/applications/traceability-en/serialization-and-traceability-in-fmcg/>

<sup>15</sup> Report on an introduction to blockchain traceability in food and supply chain- TraceX Technologies

## TRACEABILITY PLAYS A CRUCIAL ROLE ACROSS MULTIPLE SECTORS



### Healthcare Industry

As a manufacturer of pharmaceutical products, product errors or defects have no place in the healthcare industry, which deals with human health and well-being. There is a strong preference for traceability systems in the healthcare industry to comply with legal regulations manage risks that effectively assure patient and brand safety.

Implementing traceability systems worldwide fosters trust in distributing vaccines, medicines, and medical devices, promoting supply chain security, and enhancing patient safety. Traceability systems help identify and manage product recalls for device repair, control, and adjustment processes and in withdrawing a product from the market, further leading to the safety of healthcare devices.<sup>16</sup> Utilising unique identification keys at the product, lot, and unit levels, as prescribed by traceability standards, significantly enhances the current traceability level within the healthcare supply chain by enabling product tracking, tracing, and recall. Traceability systems can serve as the foundation for authentication and

counterfeit detection by safeguarding the supply chain against intrusions and diversions using real-time data.

Argentina and Saudi Arabia are among the countries that have already put a traceability system in place. China, the United States, and European Union (EU) member states are currently in the implementation phase. Previously, finished dosage forms of prescription drugs were not traceable throughout the pharmaceutical distribution supply chain in the United States. To address this issue, the Drug Supply Chain Security Act (DSCSA) was enacted in 2013, which established a comprehensive track-and-trace system in which all stakeholders are responsible for providing pertinent information.

India is also implementing measures to establish traceability within the healthcare sector. The use of 2D barcode/QR code in domestic supply for APIs and formulation drugs has been directed by the government. The national Accreditation Board for Hospitals and Healthcare Providers (NABH) has stipulated that hospitals must guarantee the traceability of medical product, drugs, and services.

<sup>16</sup> <https://www.visiott.com/solutions/medical-traceability-solutions/>



## Fashion Industry

Fashion companies are addressing sustainability challenges in their operations and supply chains by establishing grant and venture funds. However, ensuring accurate data from suppliers remains challenging, prompting companies to raise their supply chain transparency and traceability standards. In addition, some brands utilise product technologies to enhance brand engagement, loyalty and repeat purchases while supporting authentication and traceability. To address traceability concerns, digital identities are assigned to each product, providing customers with a secure and verified means to track its life cycle from raw materials to second-hand sales. New digital traceability and authentication technologies are also being used to promote circularity and sustainability,

creating value for all stakeholders in the fashion value chain. In addition, consumers increasingly demand ethical, environmentally friendly, and reliable fashion value chains, necessitating the development of new authentication and digital traceability tools to meet sustainability requirements.

Various factors created opportunities and risks, such as new growth channels, consumer behaviour shifts, and global economic complications. According to a survey by BoF McKinsey in 2022, executives anticipate that supply chain pressures, domestic luxury spending, and digital channel evolution will significantly impact their businesses. Disruption of global supply chains is the top concern for 84% of executives due to material shortages, transportation bottlenecks, and high shipping costs. As a result, executives must prioritise transparency and control measures in their supply chains to meet consumer demand.<sup>17</sup>



<sup>17</sup> *The State of Fashion 2022 Report - McKinsey & Company*

## TRACEABILITY PLAYS A CRUCIAL ROLE ACROSS MULTIPLE SECTORS



### **Agriculture Industry**

According to the UNDP's 2021 report on Blockchain for Agri-Food Traceability, the agriculture industry faces enormous pressure to produce enough food to feed the world's growing population, estimated to reach 9.7 billion by 2050. However, the current agri-food supply chains, from farm to fork, need to improve their efficiency contributing to socioeconomic and environmental problems. These inefficiencies compromise the integrity of the supply chains and can result in food safety incidents such as adulteration, dilution, tampering, or counterfeiting. Food fraud alone causes damages of up to \$40 billion annually globally. However, it's challenging to identify the source of the problem due to the opacity of the supply chains.<sup>18</sup>

Blockchain technology is finding several applications in supply chain management. A blockchain is a decentralised ledger distributed among all actors in the supply chain, providing a single source of truth and complete data visibility for all

stakeholders. As a result, blockchain technology can increase supply chain efficiency, enhance trust in the system, and reduce the likelihood of disputes by providing a record that any single actor cannot secretly alter.

Using blockchain in agri-food supply chains can bring visibility to the farm level, identifying inequities faced by small-scale producers and enabling upstream actors and policymakers to monitor for deforestation and other environmentally degrading farming activities. Furthermore, in the case of food contamination, blockchain-enabled traceability significantly improves the ease of identification and recall of the contaminated batches in the supply chain, reducing costs from loss of sales and harm to human health.

The implementation of traceability systems enables the targeted removal of specific products and the provision of precise information to the public, which helps to minimise trade disruptions. As a result, the amount of product wasted due to a lack of adequate traceability measures can be significantly reduced.

<sup>18</sup> UNDP Blockchain for Agri-Food Traceability 2021 Report

## TRACEABILITY PLAYS A CRUCIAL ROLE ACROSS MULTIPLE SECTORS



### Automotive Industry

The traceability concept helps automotive manufacturers track their uniquely identified objects throughout the supply chain, mitigating the risk of recalls, warranty issues, and breakdowns. It also protects consumers from damaged or counterfeit products, increasing customer satisfaction and significantly adding to the company's reputation in the market. Furthermore, it improves the inventory management process within the company and supports lean manufacturing processes.<sup>19</sup>

Tracking and tracing all vehicle parts and fitted gears is vital to efficient manufacturing and assembly. A unique assembly number ensures serialisation and helps to continuously track data at every process stage.<sup>20</sup>



### Electronics Industry

Electronic Manufacturing Service (EMS) providers must offer traceability information to keep their current customers and secure new manufacturing contracts. Additionally, compliance with environmental and safety regulations like the Restriction of Hazardous Substances (RoHS), Waste from Electrical and Electronic Equipment (WEEE) and the Congressional Tread Act requires manufacturers to self-certify and make traceability information available upon request. Traceability also minimises liability by decreasing the scope of product recalls in the event of issues. Finally, providing traceability offers manufacturers a competitive edge by fulfilling customer, market, and legislative requirements.<sup>21</sup>



<sup>19</sup> [https://www.movilitas.com/insights/why-traceability-matters-in-the-automotive-industry-a-modern-use-case/?utm\\_source=www.google.co.in&utm\\_medium=organic&utm\\_campaign=Google+%28India%29&referrer-analytics=1](https://www.movilitas.com/insights/why-traceability-matters-in-the-automotive-industry-a-modern-use-case/?utm_source=www.google.co.in&utm_medium=organic&utm_campaign=Google+%28India%29&referrer-analytics=1)

<sup>20</sup> <https://www.markolaser.com/customized-solutions/traceability>

<sup>21</sup> [https://www.plm.automation.siemens.com/en\\_us/Images/5893\\_tcm1023-4924.pdf](https://www.plm.automation.siemens.com/en_us/Images/5893_tcm1023-4924.pdf)



## TRACEABILITY OFFERS SEVERAL BENEFITS TO THE STAKEHOLDERS

### Reducing product loss and recall

Product recalls and product losses can financially hurt a business and tarnish its reputation in the market. There are three types of product recalls: voluntary recalls are initiated by the manufacturer or distributor to remove potentially harmful effects, while mandatory recalls are ordered by a government agency when a product poses an immediate danger to the public. Finally, a class action lawsuit is initiated by consumers seeking compensation for harm caused by a product and forcing the manufacturer or distributor to take corrective action, which may sometimes lead to a product recall.<sup>22</sup>

In 2022, a Tamil Nadu-based healthcare company recalled its product, "Artificial Tears", after an alert was issued by the Centers for Disease Control and Prevention to the US Food and Drug Administration about 55 cases of adverse events related to

the eye drop, which was imported from India. The product was under inquiry in 12 states of the US. The stakes for businesses are very high in pharmaceutical or consumable products, where the products offered by these businesses can potentially put human life at risk; there is a threat looming over these businesses in the form of legal and criminal repercussions. Consequently, it is paramount for these businesses to have a recall-ready supply chain that provides transparency throughout the supply chain to attain quick and accurate responses to emergencies.<sup>23</sup>

In the automotive industry, a settlement worth \$758 million was reached in May 2020 to address litigation related to a possible defect causing engine fires in specific vehicles, which were either included in or excluded from a sequence of recalls.<sup>24</sup>

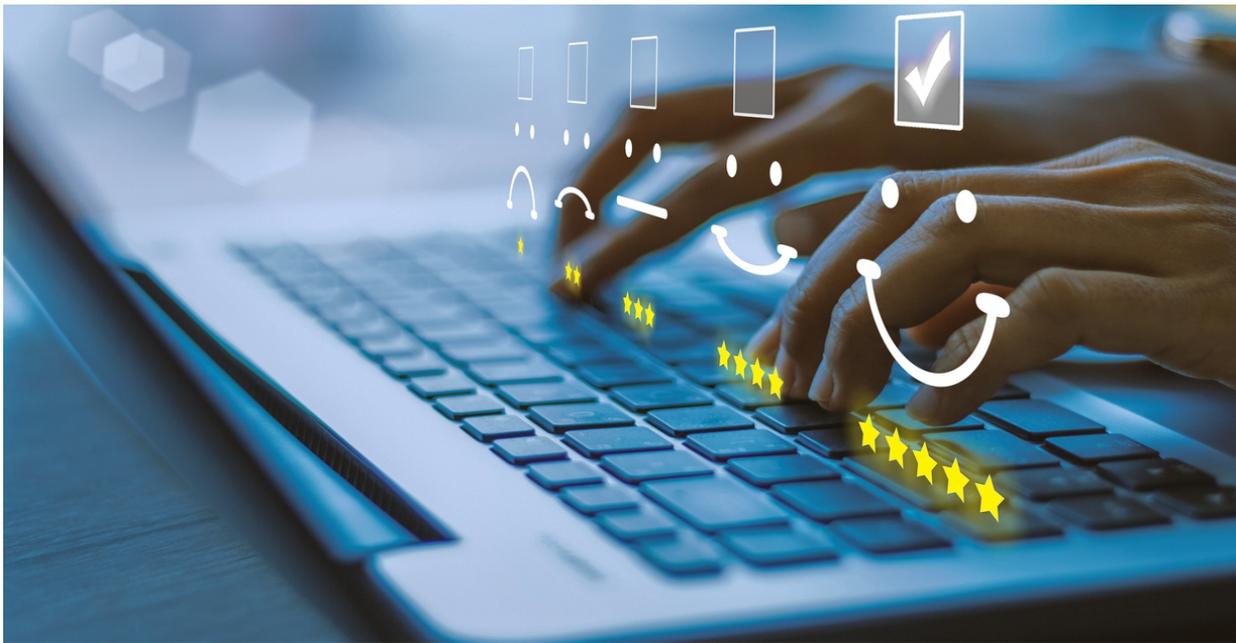
The Food Safety and Standards Authority of India has established guidelines to

<sup>22</sup> <https://support.google.com/manufacturers/answer/10634630?hl=en#:~:text=Manufacturer%20Center%20offers%20you%20the,initiated%20by%20the%20manufacturer%20themselves.>

<sup>23</sup> <https://www.gs1india.org/blog/business-ready-product-recall/>

<sup>24</sup> <https://www.classaction.org/blog/the-relationship-between-recalls-and-class-action-lawsuits>

## TRACEABILITY PLAYS A CRUCIAL ROLE ACROSS MULTIPLE SECTORS



help detect and remove counterfeit products from the supply chain, protecting the company's reputation and ensuring consumer satisfaction. Additionally, monitoring product quality through traceability can identify issues early on and enable corrective action, improving customer loyalty and satisfaction.

For instance, Turkey needed to enhance the safety and security of its supply chain to prevent illegal activities like theft, diversion, and counterfeiting. Turkey developed the Turkish Pharmaceutical Track-and-Trace System (ITS) to tackle this challenge, which uniquely identifies every pharmaceutical unit with a GS1 GTIN and serial number encoded in a GS1 DataMatrix barcode. Stakeholders scan the barcode at each stage of the supply chain, and the data is captured in the ITS database, providing a Chain of Custody (CoC) or Chain of Ownership (CoO) of the product. ITS was the first successful Pharmaceutical Track and Trace System worldwide, preventing

counterfeit drugs, fraud, theft, and barcode scams, ensuring a reliable supply of medicines to patients.<sup>27</sup>

### Helping companies gain competitive advantage

Traceability offers several benefits to companies, including improved quality control, regulatory compliance, increased efficiency, and differentiation from competitors. By tracking products through the supply chain, companies can identify quality issues, comply with regulations, streamline operations, and build consumer trust. These benefits can help companies gain a competitive advantage and achieve long-term success.<sup>28</sup>

An integrated and digitalised supply chain provides a competitive advantage by offering real-time access to critical information. Supply chain companies can adapt to new challenges and improve

<sup>27</sup> <https://www.gs1.org/standards/traceability/case-study-library>

<sup>28</sup> <https://www.enterprisetimes.co.uk/2022/04/20/turning-traceability-into-a-competitive-advantage/#:~:text=Traceability%20also%20helps%20manufacturers%20with,situation%20rectified%20before%20it%20escalates.>

## TRACEABILITY OFFERS SEVERAL BENEFITS TO THE STAKEHOLDERS

govern food recalls for food business operators, including the entire recall process, post-recall reporting, and measures to prevent future incidents. The onus of initiating the recall process lies with the food business operator, but the Chief Executive Officer or Commissioner of Food Safety can also direct it. Failure to comply with the recall process may result in consequences under the Act or related regulations. If a recall is deemed ineffective or unsafe food continues to be produced, the Chief Executive Officer or Commissioner of Food Safety will take appropriate action. The guidelines also extend to imported food recalls.<sup>25</sup>

By implementing an effective traceability system, companies can track products as they move through the supply chain, identifying potential issues or defects early on. Traceability helps prevent product loss by enabling companies to take corrective action before products are lost or damaged beyond repair. In the event of a recall, traceability can help companies quickly identify the affected products and their

point of origin, enabling them to remove them from the market promptly. As a result, it reduces the risk of harm to consumers and minimizes the impact on the company's reputation and financial bottom line. Traceability is essential for companies looking to reduce product loss and recalls.

### Fighting Counterfeit products and ensuring product quality

In a world where counterfeit drugs and medical devices are circulating, customers increasingly need to verify their medicine's authenticity. An OECD research study from 2021 shows that the total global valuation of counterfeit goods stood at \$509 billion.<sup>26</sup> An efficient traceability system is required to complement monitoring efforts and to confirm the authenticity of products and quality of their attributes.

Companies can ensure the authenticity and quality of their products by implementing a traceability system that tracks them through the supply chain. Traceability can



<sup>25</sup> <https://scroll.in/latest/1043208/indian-firm-recalls-eye-drops-after-us-alerts-55-cases-of-adverse-effects-one-death>

<sup>26</sup> <https://www.circularise.com/blog/anti-counterfeiting-fighting-fakes-in-plastics-with-traceability>,  
<https://www.gs1india.org/blog/business-ready-product-recall/>

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financial returns while gaining a competitive advantage by embracing new technologies and utilising the right mix of people, processes, and data.<sup>29</sup>

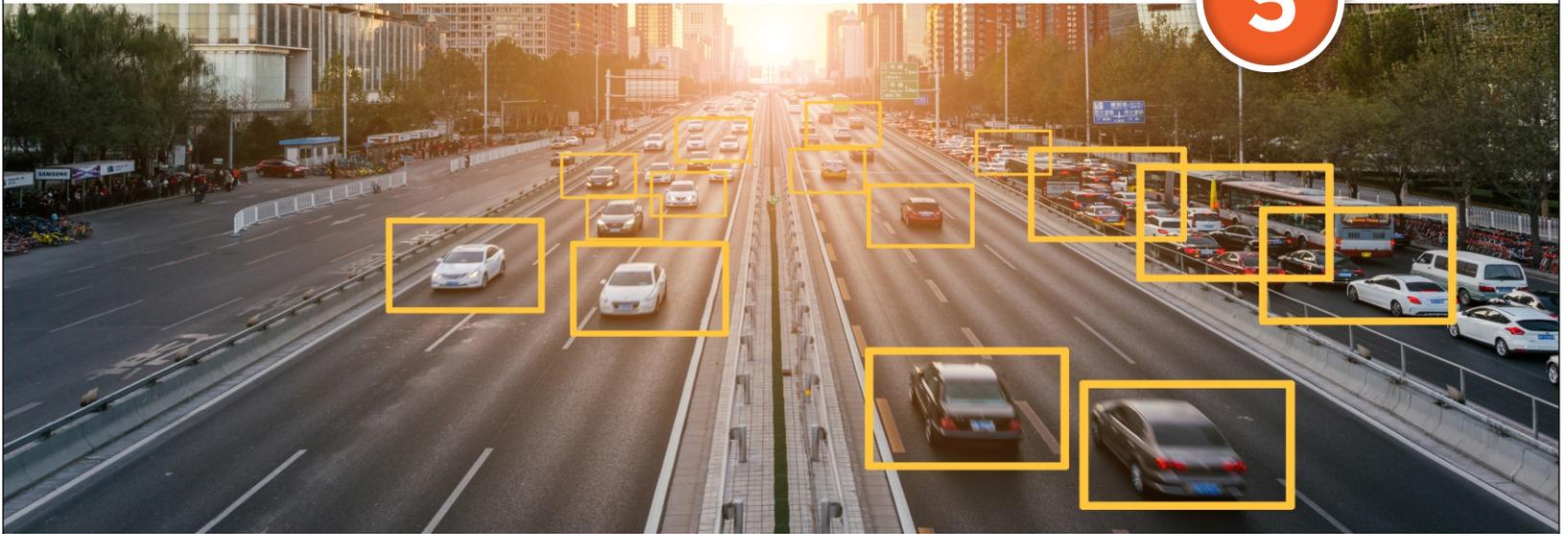
The shift in consumer trends towards demanding greater transparency regarding sustainable sourcing, recycled raw materials, and product life-cycle footprint is a significant opportunity for sustainable and transparent businesses. Today's

consumers are interested in understanding their purchasing choices' effect on the world and are prepared to spend extra money on products and services that provide this information. According to EY's Future Consumer Index 2022, 43% of global consumers want to buy more from companies that positively impact society, even if it costs more. Additionally, 61% of consumers want more product information to make sustainable choices.<sup>30</sup>

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<sup>29</sup> <https://blog.tracktracex.com/traceability-as-a-competitive-advantage>

<sup>30</sup> [https://www.ey.com/en\\_dk/consulting/sustainability-and-traceability-will-be-a-future-competitive-advantage](https://www.ey.com/en_dk/consulting/sustainability-and-traceability-will-be-a-future-competitive-advantage)



## TECHNOLOGY, PROCESSES AND STANDARDS ARE KEY BUILDING BLOCKS OF TRACEABILITY

**T**raceability utilises several technologies and processes that track and trace goods, materials, and information. Standards are equally necessary for traceability as they provide a framework to ensure traceability systems' accuracy, reliability and consistency across different organisations and industries.<sup>31</sup> Traceability systems combine technology, processes, and standards.

### Technology

Traceability systems identify and track products with the help of advanced technologies such as barcodes, QR codes, RFID tags, and IoT sensors. Automation of data collection, storage, management, and accessibility are all made possible by the different technologies, some of which are:

#### Barcode and RFID technology



These technologies provide real-time data on the site and the status of goods. They are placed on products, packaging, shipping containers and locations to track and trace the movement of goods.

#### QR code and blockchain technology



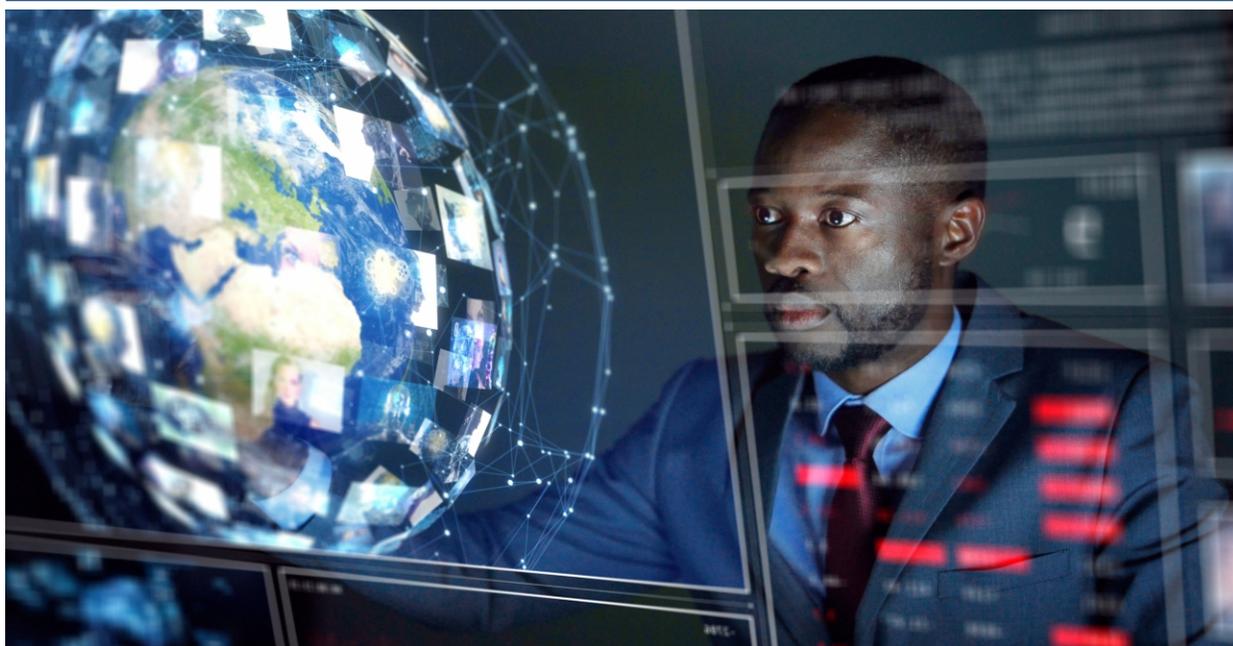
They provide a secure and tamper-proof record of the product's origin, movement, and handling. QR codes can be scanned with a smartphone to access information about a product.

#### Data analytics



Data analytics help improve performance, identify potential issues early, and make better business decisions by identifying trends and patterns in the data collected through traceability systems.

<sup>31</sup> <https://blog.insresearch.com/blog/bid/197088/3-Steps-to-Achieving-End-To-End-Product-Traceability-DATA>



## Processes

Well-defined processes incorporating all aspects of a supply chain, from production to delivery, are vital in implementing traceability systems. These consist of methods to capture, store, and access product tracking and tracing data. Additionally, there are controls present to ensure data quality and accuracy. Processes involve:

### Identification system:

An identification system can identify the products, packaging, and boxes related to their origin and prior handling. By using identification codes attached to the product, the system ensures control until the final stage of the supply chain.

Although companies use various identification systems suited to their needs, relevant and modern management tools are essential to work correctly and provide linkages and automation regarding tasks.



### Data capture system:

Since this system captures data, each stakeholder can add necessary information or data to the supply chain, given that the right technology supports the plan.



### Digital tool for data management:

It is equally important to analyze and make sense of data as it is to collect it to make it acceptable for use by relevant tools and technology. The system must allow the hosting of the collected information and interaction with the business management systems.



### Data register:

The data register contains data that has been recorded, analysed, and assigned for use. It contains traceability information filtered by different product characteristics, such as the type of product, sector and user requirements.<sup>32</sup>

<sup>32</sup> <https://blog.insresearch.com/blog/bid/197088/3-Steps-to-Achieving-End-To-End-Product-Traceability-DATA> , <http://blog.wearedrew.co/en/how-to-implement-a-traceability-system-in-your-company>

## Standards

Standards help define frameworks that could apply to traceability frameworks across all industries and sectors. They comprise of a set of guidelines on product identification, information gathering, record-keeping requirements and several other purposes of traceability.

There are four type of standards in traceability: Different kinds of standards include the following:



### Data standards:

Facilitate accurate and consistent collection, storage, and data sharing through traceability systems. They are available for data formatting, data quality, and data security.



### Industry standards:

Industry-specific standards ensure traceability systems apply to different industries and their unique needs. For

example, traceability standards assure safe and high-quality food in the food industry.



### International standards:

International standards make traceability systems to global trade needs possible by laying out a consistent and agreed-upon framework for tracking and tracing goods, materials, and information.



### Technical standards:

These standards ensure the seamless working together of traceability systems. They are relevant to communication protocols, data transmission and storage.<sup>33</sup>

Standards in traceability systems help to ensure adherence to industry-specific or international standards to ensure consistency and compatibility across different supply chains. The Global



<sup>33</sup> <https://blog.Insresearch.com/blog/bid/197088/3-Steps-to-Achieving-End-To-End-Product-Traceability-DATA> , <https://www.gs1.org/standards/gs1-global-traceability-standard/current-standard#3-Traceability-data-and-traceability-systems+3-1-Traceability-data-within-an-organisation>

## TECHNOLOGY, PROCESSES AND STANDARDS ARE KEY BUILDING BLOCKS OF TRACEABILITY



Traceability Standard (GTS) provides guidelines for traceability in the food and agriculture industries. The Medical Devices industry uses Medical Device Traceability Standard (MDTS) for traceability.

Standards providing several benefits in a traceability system:

1. **Unique identification:** Standards play a vital role in supply chain management by providing a unique identifier for the transported objects and the departure and arrival locations for the enchanted objects. They also address “Who, what, when, where, and why” in the context of traceability. Identification keys create a seamless and transparent flow of information by linking the physical and information flows within a supply chain of a trading partner’s processes to those of different trading partners.<sup>34</sup>
2. **Process automation:** Standards allow for the seamless sharing of data on the physical movement and status of products throughout the supply chain, enabling efficient and effective coordination between all parties involved. Furthermore, they allow for
3. **Interoperability among different systems:** Traceability implementation is possible thanks to several information technologies and tools, such as systems for managing product identification and data, solutions for automatic identification and data capture, and strategies for capturing transactional or event data. However, the overall maturity levels of different parties across a supply chain may challenge interoperability, mainly if various parties utilise other technologies across the same supply chain. Standards-based systems and components will enable interoperability across systems since all the systems within the supply chain will conform to the same standards.<sup>35</sup>

<sup>34</sup> <https://www.gs1.org/standards/traceability>

<sup>35</sup> [https://www.gs1.org/sites/default/files/docs/traceability/GS1\\_Global\\_Traceability\\_Standard\\_i2.pdf](https://www.gs1.org/sites/default/files/docs/traceability/GS1_Global_Traceability_Standard_i2.pdf)

## GS1 INDIA ENABLES TRACEABILITY PROGRAMS THROUGH DATAKART TRACE PLATFORM

**G**S1 creates a universal and standard language for traceability solutions and develops a framework for their implementation. With collaborations and community development, the creation of product and location registries, training, and local implementation services, GS1 ensures that the traceability industry vision is both feasible and scalable. By utilising GS1-enabled traceability solutions, companies can achieve interoperability, safeguard their investments, and increase their capacity for growth. In addition, with these solutions, digitalisation, speed, and data accuracy are significantly improved, allowing each partner in the supply chain to select the best solution to fit their specific needs.

GS1 offers sector-specific traceability standards to facilitate traceability across and within different industries. GS1 identification standards, such as the Global Trade Item Number (GTIN) and Global Location Number (GLN), provide unique

identification for objects moving through supply chains and the locations they travel to and from. Using barcodes and EPC/RFID data capture standards, in conjunction with data sharing standards like the Global Data Synchronisation Network and EPCIS, enables the automation of information processing and sharing among trading partners.<sup>36</sup>

GS1 India enables industries globally to align their system inventory with their physical inventory, allowing them to monitor the real-time location of their products throughout the supply chain with its DataKart Trace platform.<sup>37</sup> DataKart is a repository for product information, including attributes such as ingredients, components, product images, MRP, net content, dimensions, manufacturing and expiry dates. This streamlined information is accessible and sharable in real time, allowing stakeholders to access accurate, trusted, and updated data in a standardised and structured manner. As a

<sup>36</sup> <https://www.gs1.org/standards/traceability>

<sup>37</sup> <https://www.gs1india.org/datakart-trace/>

## GS1 INDIA ENABLES TRACEABILITY PROGRAMS THROUGH DATAKART TRACE PLATFORM



result, it improves the efficiency and accuracy of the supply chain and helps consumers make informed purchasing decisions.

DataKart helps in data management, traceability, data analytics, collaboration, and data compliance with domestic and global regulatory requirements such as FSSAI recall criteria etc. It reduces the risk of pilferages, strengthens customers' trust, provides greater visibility into inventories, and makes it possible to manage product expiries better.

DataKart also supports the ClickIt App and e-Cataloguing & Imaging, which captures e-commerce-ready product photos, takes care of product cataloguing needs and saves time for focusing on other critical aspects of the business.

Over a thousand companies use DataKart, including Sun Pharma, Procter & Gamble, Emami, Nestle, Parle, Godrej, Hindustan Unilever Limited, Abbott, Jio Smart, Reliance Retail, Big Basket, and more.

The Indian government effectively utilizes

GS1's DataKart Trace system to bring visibility to various sectors. For example, the Delhi Excise Department uses the GS1 standard-based traceability system to effectively track and trace liquor and empower customers to authenticate their liquor before consumption.

The Indian Army adopted the DataKart system in 2019 to ensure the quality of food supplies by closely monitoring frozen and dry rations from production to the Army Unit Canteens and providing updated information on the products' origin, processing, packaging, and transportation. The DataKart also facilitates inventory management, end-to-end traceability of food items, and implementation of the FIFO (First In, First Out) inventory method, minimises manual interventions, reduces the risk of human errors, and ensures the supply chain aligns with FSSAI's guidelines. The Indian Army utilises GS1 traceability systems, specifically RFID tags, to monitor the movement of their ammunition throughout the supply chain, from various locations to

## GS1 INDIA ENABLES TRACEABILITY PROGRAMS THROUGH DATAKART TRACE PLATFORM

the central ammunition depot, to maintain detailed information about each ammunition product.<sup>38</sup>

In addition, the Indian Railways uses the platform to manage and track the real-time location of its assets, such as wagons, coaches, and locomotives. It helps the Railways capture accurate data on these assets in transit and use the information more efficiently. The Indian Railways incorporated GS1 RFIDs tags to track the movement of rail wagons and to have details about the goods being transported, thus ensuring visibility.<sup>39</sup>

The DataKart platform also supports TATA Pravesh by comprehensively tracking its products under the Tata Pravesh brand. Once installed, customers can use the Smart Consumer mobile app to report any issues. TATA Pravesh utilises GS1 RFID tags and barcodes to gather product information at various points along the supply chain, such as warehouses, distribution channels, and retail stores. It allows TATA Pravesh to manage its supply chain effectively, increase operational efficiency, and boost profitability.<sup>40</sup>



<sup>38</sup> <https://www.gs1india.org/datakart-trace/>

<sup>39</sup> <https://www.gs1india.org/media/25years-milestones.pdf>, <https://www.gs1india.org/datakart-trace/>

<sup>40</sup> <https://constructiontimes.co.in/tata-pravesh-showing-wood-the-door/#:~:text=Tata%20Pravesh%20is%20a%20pioneer,Wood%20finish%20steel%20doors%20%26%20windows,https://www.gs1india.org/datakart-trace/>



# TESTIMONIALS

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The GS1 team has contributed immensely as far as the food traceability system is concerned, transparency, and accountability. In experience with GS1 India in the last 3 years, in spite of COVID or no COVID, they are extremely responsive, dependable, and trustworthy, people with very high integrity.

**Indian Army**

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We have availed GS1 India's consultancy and DataKart Trace services, which helped to establish visibility across all stakeholders. All products are uniquely identified using a GS1 Data Matrix barcode with a serialised GTIN, which is generated and labelled on the product at the time of manufacturing.

**TATA Parvesh**

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It has been a wonderful experience working with GS1 India towards strengthening traceability and enhancing market access for Indian spices. GS1 India's world-class expertise in the field of traceability and agriculture value chains is helping UNDP and spices board India in the development of India's first ever Blockchain-powered traceability system for Indian spices.

**UNDP**

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### **About GS1 India**

GS1 India is a standards organisation setup by the Ministry of Commerce and Industry, Government of India, and apex trade bodies comprising CII, FICCI, ASSOCHAM, FIEO, IMC, BIS, IIP, Spices Board, and APEDA to spread awareness and provide guidance on the adoption of global standards by Indian industry and government on barcodes and RFID. In order to support the industry, GS1 India has developed a standards-based DataKart Trace service that provides seamless supply chain traceability, provides end-to-end visibility, and can be used by multiple industry sectors.

