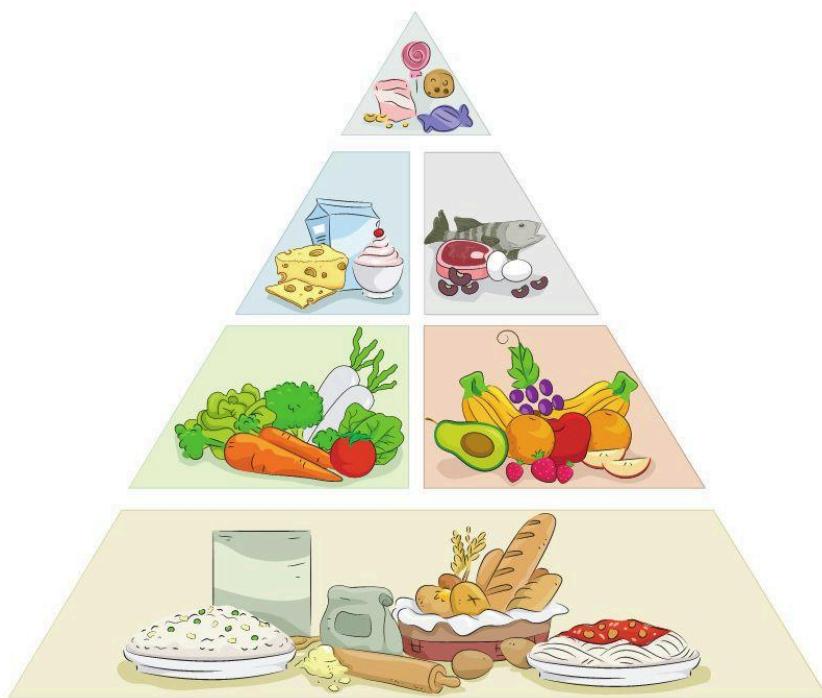


Traceability in the Food & Beverage Industry



Bob Mazzei

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Author's Note

This is a brief publication that will walk you through the intricacies of food traceability.

You may notice some repeats; yet, these are helpful in emphasising specific concepts and practices that are critical in ensuring transparency and linearity in the comprehension of this important standard.

This handbook is intended to assist all stakeholders involved in the food and beverage supply chain, including consumers, for whom these regulatory requirements were created.

Introduction

When EU Regulation 178/2002 for food traceability became mandatory on January 1, 2005, I began translating all of its criteria into executable processes assisted by bespoke software for all my clients.

I implemented all of the procedures necessary for farmers, distributors, wholesalers, and retailers to comply with the legal norm.

Of course, my solution entailed developing a system to codify all of the necessary phases and identify all items with unique IDs to ensure clear and understandable farm to fork standards.

When a new regulation becomes mandatory, no insider will ever exclaim, "Wow! It's what we've been waiting for!" On the contrary, it is easier for them to complain since additional procedures and bureaucratic duties slow down and complicate the task, and it is true, they might do so to the point of making the sale almost impossible.

Therefore, as with many other things, my task was to simplify, streamline, and make the system understandable to all operators.

When designing a new operating procedure, consideration must be given to the processes already in place and how to modify these to comply with the new legal regulation.

Everything must flow easily and with minimal impact.

In this case, there is always a general and nearly identical part for each sort of organisation, as well as a more complex part that must account for the specifics and must thus be personalised.

This guide will not delve into these details because it is not a traceability system, but rather a discussion of what traceability is, how it works, and what some challenges are for companies in the field.

I'll also give some hints about software solutions that can be used, but only in a generic and non-specific way.

Let's go!

The Supply Chain in the F&B

The supply chain of food and beverage roughly comprises the following players:



Sometimes, the stages from producer to consumer are lengthened by further intermediaries, such as processors/packagers, agents, different types of dealers etc.

Businesses in the Chain

Farming (Fruits, Vegetables, and Cattle); Fisheries & Aquaculture; Dairy; Poultry and Eggs; Bakery & Confectionery; Drink (Alcohol beverage industry, Soft drink industry, Bottled water); Food processing industries.

Upstream & Downstream

The global food and beverage industry is made up of many segments, which include the seed and animal feed sector upstream of the supply chain, while downstream of the supply chain there are groceries, restaurants, cafeterias, cafés, fast-food joints, pubs, delis, catering businesses, food transportation services, and more. In between the chain, a

crucial role is played by distributors, wholesalers, and retailers.

Activities in this industry can range from packaging to preparing, transporting, and serving food or beverages. It is a huge sector, with millions of operators and where everyone is a consumer.

General Overview

Summing up we can say that the food and beverage supply chain refers to the process of producing, transporting, storing, and delivering food and beverages to consumers. It involves a complex network of interconnected activities and entities that work together to ensure the availability of food and beverages in the market. Here is a general overview of how the food and beverage supply chain works.

Sourcing and Procurement

The supply chain begins with sourcing raw materials such as agricultural produce, ingredients, and packaging materials. Food and beverage manufacturers typically establish relationships with farmers, growers, and suppliers to ensure a consistent supply of high-quality raw materials.

Manufacturing and Production

Once the raw materials are procured, they undergo various manufacturing and production processes. This may involve sorting, processing, blending, cooking, packaging, and labelling. Food safety and quality standards are crucial at this stage to ensure compliance with regulations and meet consumer expectations.

Distribution and Warehousing

After the products are manufactured, they are transported to distribution centres or warehouses. These facilities act as intermediate storage points where inventory is managed, orders are processed, and products are prepared for shipment. Warehouses play a vital role in maintaining proper inventory levels and ensuring efficient order fulfilment.

Transportation

Transportation is a critical component of the food and beverage supply chain. Products need to be transported from manufacturing facilities or warehouses to retailers, wholesalers, or directly to consumers. Depending on the distance and nature of the products, transportation modes may include trucks, trains, ships, or air freight.

Retailing and Sales

Food and beverages are distributed to various retail outlets such as grocery stores, supermarkets, restaurants, cafes, and convenience stores. These establishments stock the products on their shelves or use them as ingredients in prepared meals. Some food and beverage manufacturers may also sell directly to consumers through online platforms or their own retail stores.

Consumption

The final stage of the supply chain is when consumers purchase and consume the food and beverages. At this point, the supply chain loop restarts as consumers' demand drives the need for production and distribution to meet future requirements.

Throughout the supply chain, various stakeholders play crucial roles, including farmers, suppliers, manufacturers, distributors, retailers, and logistics providers. Effective

coordination, communication, and collaboration among these entities are essential to ensure a smooth flow of products, minimise waste, maintain quality, and meet customer demands.

Clearly, all supply chain players must comply with the law, quality standards, food, environmental, and labour safety. Traceability is one of these key legal criteria.

It's important to note that the food and beverage supply chain can vary depending on the specific product, geographical region, and market segment. Factors such as seasonality, perishability, regulatory requirements, and consumer preferences can also influence the intricacies of the supply chain for different food and beverage categories.

Legal Requirements

Traceability is required by specific legislation in almost every country.

In the European Union, traceability was established by means of [EU Regulation 178/2002](#) which was enforced in all EU Countries on January 1st, 2005.

In the UK, the FSA (Food Standards Agency) is updating all EU references, to accurately reflect the law now in force, in all new or amended guidance published since the Transition Period ended at the end of 2020. [Check here](#)

In the USA, traceability is enforced by the Food & Drug Administration by means of the Food Safety Modernization Act 2001, which is being submitted to further revisions and restrictions. Check here for [traceability regulations in the USA](#), and [here for the full text of FSMA](#).

Food & Beverage Businesses' Responsibility

All operators in the food and beverage supply chain are responsible for the safety of the foods/drinks that they produce, distribute, store, or sell.

All of them must:

- ✓ Not place unsafe food or drinks on the market (food is unsafe if it is injurious to health or unfit for human consumption).
- ✓ Comply with food law in the production, distribution, storage, and sale of food.
- ✓ Be able to trace suppliers of food/drinks and the business customers that they have supplied.
- ✓ Remove unsafe food from the market in the event of a food safety incident.

Consequently, all businesses in the food and beverage sector are required to:

- ✓ Have traceability information for their suppliers and business customers (one step back and one step forward).
- ✓ Retailers, including caterers, are not required to keep traceability information where they sell to the final consumer. However, where they supply food businesses, all traceability requirements must be adhered to. This means that they are not obliged to track private consumers but, of course, they are obliged to track their suppliers and

therefore only buy and sell food / beverages that have the legal requirements for traceability.

- ✓ Have systems and procedures in place to allow for traceability information to be made available to enforcement authorities on demand.
- ✓ Label or identify food/drinks placed on the market to facilitate traceability.
- ✓ Have specific systems and procedures for products of animal origin and sprouted seeds as they are subject to specific traceability requirements (very rigorous).

The Difference between tracking and tracing

This is a crucial distinction, which may appear academic but is not.

Tracking and tracing are two distinct processes within the food industry that are used to monitor and manage the movement of food products. While they are related, they serve different purposes.

Tracking

Food tracking refers to the process of monitoring the movement and location of food products throughout the supply chain. It involves capturing and recording information at various stages, such as when the food is harvested, processed, packaged, and distributed. Tracking systems typically use technologies like barcodes, RFID (Radio Frequency Identification), or QR codes to collect and store data related to product identification, batch numbers, dates, and locations.

The purpose of tracking is to enable stakeholders in the supply chain to have visibility and control over the movement of food products. It helps in managing inventory, optimising logistics, and identifying potential bottlenecks or delays. Tracking systems also contribute to food safety and quality management by allowing rapid identification and recall of products in case of any issues or contamination concerns.

Tracing

Food tracing is the process of investigating and documenting the history, location, and distribution of a specific food product or batch. It is typically used in response to a food safety incident, outbreak, or contamination issue. Tracing aims to identify the source of the problem and track the affected products throughout the supply chain.

When a food safety issue arises, tracing involves backward tracing and forward tracing:

Backward tracing

This involves retracing the steps of the affected product from the point of sale back to its origin. It helps identify the specific batch, production facility, or source of contamination responsible for the issue. Backward tracing relies on accurate and detailed records of the product's movement and associated information.

Forward tracing

Once the source of the problem is identified, forward tracing is used to determine the distribution and locations of the affected product. It helps identify which other retailers, distributors, or consumers may have received or purchased the contaminated product, enabling targeted recalls or withdrawals.

Tracing is crucial for ensuring food safety and protecting public health. It allows for rapid and effective responses to incidents, preventing the spread of contaminated products and minimising the impact on consumers.

Both tracking and tracing systems, when implemented effectively, provide transparency, accountability, and efficiency in the food supply chain. They help stakeholders in the industry to manage logistics, enhance food safety measures, and respond promptly in case of any issues or recalls.

Compendium of legislations and documents

EU regulations and documentation

EU FOOD SAFETY

EU FOOD LAW GENERAL REQUIREMENTS

EU REG. 178/2002

EU FOOD TRACEABILITY

United Kingdom regulations and documentation

UK FOOD STANDARDS AGENCY

TRACEABILITY AND LABELLING

KEY REGULATIONS

GENERAL FOOD LAW

WITHDRAWALS & RECALLS

EU TRANSITION

APPENDICES

FOOD & FEED LAW GUIDE

USA regulations and documentation

FOOD SAFETY MODERNIZATION ACT (FSMA)

WHAT'S NEW IN FSMA

Why food traceability is important for consumers

Food traceability is important for consumers for several reasons.

Food Safety

Traceability allows for quick and accurate identification of the source of foodborne illnesses or contamination incidents. In case of a food safety issue, such as a recall or outbreak, traceability enables authorities and companies to track and remove the affected products from the market, reducing the risk of consumer exposure to unsafe food.

Quality Assurance

Traceability provides consumers with assurance about the quality and authenticity of the food they consume. It allows them to know the origin of the product, the production methods used, and the certifications or standards followed. This information helps consumers make informed choices about the food they buy, especially for those with specific dietary requirements, allergies, or ethical concerns.

Transparency and Trust

Traceability promotes transparency in the food supply chain, fostering trust between consumers and food producers. When consumers have access to information about where their food comes from and how it was produced, they can make more informed decisions and have confidence in the products they purchase.

Allergen Management

Traceability is crucial for individuals with food allergies or intolerances. By providing detailed information about the ingredients and processing methods, traceability helps consumers identify and avoid allergens that may pose a risk to their health. This enables them to make safer food choices and reduces the likelihood of accidental allergen exposure.

Sustainability and Ethical Concerns

Consumers are increasingly interested in the environmental and ethical aspects of the food they consume. Traceability allows them to understand the sustainability practices, fair trade certifications, or animal welfare standards associated with a particular product. This empowers consumers to support companies that align with their values and make choices that contribute to a more sustainable and responsible food system.

Product Authenticity

Traceability helps in combating food fraud and ensuring product authenticity. It enables consumers to verify the origin and integrity of products, particularly for high-value or premium items. By knowing the product's journey from farm to fork, consumers can have confidence in the genuineness and quality of the food they purchase.

In conclusion, food traceability empowers consumers by providing them with accurate information, enhancing food safety, supporting their dietary needs, promoting sustainable practices, and fostering trust in the food system. It enables consumers to make informed choices that align with their values, ensuring a safer and more reliable food supply.

What does from farm to fork actually mean?

You should be familiar with the expression "from farm to fork," which implies to ensure complete transparency throughout the supply chain.

In 1971, Alice Waters, a supporter of local, sustainable agriculture, launched the famed Chez Panisse in Berkley, California. Organically Grown, a non-profit organisation, opened in Oregon a few years later, in 1979. Then, Carlo Perini created the Slow Food Organisation in Italy in 1986, bringing the idea to Europe. This stimulated a movement for wholesomeness in food and drink, and gradually the concept of knowing the journey from farm to fork took hold.

Thus, "from farm to fork" is a phrase commonly used to describe the entire journey of food production, processing, distribution, and consumption. It encompasses the entire food supply chain, highlighting the interconnected stages involved in bringing food from its origin to the consumer's plate. Here's a breakdown of what each step represents in the "from farm to fork" process:

Farming

This stage involves agricultural activities such as growing crops, raising livestock, or cultivating seafood. It encompasses practices like planting, irrigation, fertilisation, pest control, and animal husbandry. Farmers and producers work to ensure the optimal growth and health of plants and animals for food production.

Harvesting

Once crops have matured or livestock has reached the appropriate stage, they are harvested or slaughtered. This

step involves gathering fruits, vegetables, grains, or fish, as well as the processing of animals for meat production.

Processing and Manufacturing

After harvest, food products often undergo processing or manufacturing to transform raw materials into various food items. This stage includes activities such as cleaning, sorting, cutting, grinding, cooking, preserving, and packaging. Processing can take place in facilities such as factories, mills, canneries, or dairies.

Packaging and Labelling

Food products are packaged and labelled to ensure safety, preserve quality, and provide essential information to consumers. Packaging materials can range from bottles, cans, and boxes to bags, pouches, or containers. Labels provide details such as ingredients, nutritional information, allergen warnings, and expiration dates.

Distribution and Logistics

Once packaged, food products are transported from the manufacturing facilities to distribution centres or warehouses. From there, they are further distributed to retailers, restaurants, wholesalers, or directly to consumers. This stage involves logistics planning, storage, inventory management, and transportation to ensure timely delivery and minimise spoilage or waste.

Retail and Consumption

Food products reach the final stage, where they are available for purchase and consumption by consumers. This includes supermarkets, grocery stores, farmers' markets, restaurants, cafes, and other food service establishments. Consumers make

choices based on their preferences, needs, and dietary requirements, ultimately consuming the food.

The "from farm to fork" concept emphasises the importance of understanding the entire journey of food, from its origins in agriculture to the moment it is consumed. It highlights the various stages involved in food production, processing, distribution, and sale, underscoring the need for transparency, traceability, and responsible practices throughout the supply chain to ensure food safety, quality, and sustainability.

Challenges for the food and beverage industry

The food and beverage industries face several challenges when it comes to traceability compliance. These challenges can vary depending on the specific sector, region, and regulatory environment, but here are some common issues.

Fragmented Supply Chains

Food and beverage supply chains can be complex and fragmented, involving multiple suppliers, distributors, and intermediaries. Tracking and tracing products throughout such intricate networks can be challenging, particularly when there is a lack of standardised processes or communication systems between different entities.

Limited Data Standardization

Traceability relies on consistent and standardised data collection and sharing. However, there is often a lack of uniformity in data formats, terminology, and coding systems across the industry. This can create difficulties in aggregating and analysing information effectively, hindering traceability efforts.

Manual Record-Keeping

Some companies still rely on manual or paper-based record-keeping systems, making traceability more labour-intensive and prone to errors. Manual processes can lead to delays, inaccuracies, and difficulties in retrieving and analysing information in a timely manner.

Technological Barriers

Implementing traceability systems often requires the adoption of appropriate technologies and infrastructure. Small and medium-sized enterprises (SMEs) may face challenges in terms of affordability, technical expertise, and compatibility with existing systems when implementing traceability solutions.

Data Sharing and Collaboration

Effective traceability often requires collaboration and information sharing among stakeholders along the supply chain. However, concerns about data security, proprietary information, and competitive advantage can sometimes hinder the willingness to share data and collaborate effectively.

Global Supply Chains

With an increasingly globalised food market, products often traverse international borders, making traceability compliance more complex. Diverse regulatory requirements, language barriers, and varying levels of traceability infrastructure across countries can pose significant challenges for companies operating in multiple jurisdictions.

Product Diversity and Complexity

The food and beverage industry encompasses a wide range of products, including fresh produce, processed foods, beverages, and ingredients. Each product category has its unique

traceability considerations, with varying levels of complexity, shelf life, and packaging requirements. Ensuring traceability for diverse product portfolios can be demanding for companies.

Cost and Resource Constraints

Implementing traceability systems, especially those that involve advanced technologies like RFID or blockchain, can be costly. Smaller businesses or those operating with limited resources may find it challenging to invest in and maintain traceability infrastructure and comply with evolving regulations.

Addressing these challenges requires a collaborative effort from industry stakeholders, regulatory bodies, and technology providers. Encouraging standardisation, promoting the adoption of digital traceability solutions, providing guidance and support to small businesses, and fostering greater transparency and data sharing can help overcome these obstacles and enhance traceability compliance in the food and beverage industries.

The role of Software in traceability

A robust software system can play a significant role in enhancing food traceability in several ways. Let's see how it can help.

Data Collection and Management

A robust software system can automate data collection processes throughout the supply chain, capturing relevant information such as batch numbers, dates, locations, and product attributes. This ensures accuracy, consistency, and efficiency in collecting traceability data. The software can

also store and manage this data in a centralised database, making it easily accessible and searchable when needed.

Barcode and RFID Integration

Software can integrate with barcode or RFID technology, enabling the automatic identification and tracking of products at various stages of the supply chain. This facilitates real-time data capture, reduces human error, and enhances the speed and accuracy of traceability information.

Serialisation and Unique Identifier Assignment

Software can assign unique identifiers or serial numbers to individual products, enabling precise tracking and tracing of each item. This enables the identification of specific batches or units in the event of recalls, contamination incidents, or quality issues.

Real-time Monitoring and Alerts

A robust software system can provide real-time monitoring of critical parameters such as temperature, humidity, and location during transportation and storage. It can generate alerts and notifications if any deviations occur, ensuring immediate action can be taken to preserve the quality and safety of the products.

Supply Chain Visibility

Software can offer real-time visibility into the entire supply chain, allowing stakeholders to track the movement and status of products from farm to fork. This visibility enables quicker identification of potential bottlenecks, delays, or issues that may impact traceability and allows for proactive management and decision-making.

Traceability Documentation and Reporting

Software can generate comprehensive traceability reports and documentation, providing a clear record of the product's journey and associated information. This documentation can be critical for regulatory compliance, audits, and investigations, facilitating efficient traceability in case of recalls or food safety incidents.

Integration with Partners and Regulatory Systems

Robust software can integrate with external systems, such as suppliers, distributors, retailers, and regulatory authorities. This enables seamless data exchange, collaboration, and compliance with traceability requirements and standards across the supply chain.

Blockchain Technology

Some software systems leverage blockchain technology to enhance traceability by providing immutable and transparent records of product transactions and movements. Blockchain ensures data integrity, security, and trust, making it easier to trace the origin and journey of products.

Personally, I believe that the implementation of Blockchain technology is unnecessary, despite my recognition of its attributes and appreciation of its numerous benefits.

Blockchain technology is in fact quite expensive and does not ensure speed to the system. Although it provides high levels of security, I can tell you that outstanding performance may be attained through the use of less expensive and impactful solutions.

I have so far designed and developed traceability systems for dozens of companies without the need to use the Blockchain and everything works perfectly.

In sum, a robust software system acts as a central hub for traceability data, streamlines data collection and management, enhances real-time monitoring and alerts, facilitates supply chain visibility, and supports documentation and reporting requirements. By leveraging technology, software solutions contribute to more accurate, efficient, and reliable food traceability processes, ultimately improving food safety, quality, and consumer trust.

Conclusions

Traceability is a legal obligation as well as an excellent marketing tool if implemented through an efficient system that clearly communicates to the consumer the information required for them to make an informed purchase, which is a legal right.

Its operations are complex because it has to ensure requirements regarding the origin and wholesomeness of foods and drinks and their production processes. Besides, supply chains are made up of various players and involve geographical, regulatory, manufacturing, and more complexities.

However, the system can be made simple for staff to use and become a very helpful tool in day-to-day practices.

For any requests, do not hesitate to [contact me](#).

Contacts

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