

open food chain

Whitepaper

1. Summary

2. Why open food chain?

- 2.1. Problems in search of a solution
- 2.2. Low consumer trust as fraud increases
- 2.3. One third of our food does not reach a plate
- 2.4. Nutritional values are lost

3. How does Open Food Chain Work?

- 3.1. Juicy Chain Case Study
- 3.2. Governance Structure
- 3.3. Competitive Analysis
- 3.4. Roadmap

4. What is Open Food Chain?

- 4.1. Why blockchain?
- 4.2. Public infrastructure for technical strength and adoption
- 4.3. Strong efficient consensus mechanism
- 4.4. UTXO-based tracking
- 4.5. Data model
- 4.6. Interoperability
- 4.7. Batch matching
- 4.8. Komodo infrastructure

5. Token Utility

- 5.1. Users
- 5.2. Web3 service providers

1. Summary



The food system is plagued with issues like broken trust, excessive waste, and rising obesity levels. It's a low-digitized industry with few mass-adopted innovations, and the pressure on the food system is increasing with our growing population. Industry players are seeking radical transparency to address these issues, but the challenge lies in establishing cost-effective solutions.

Enter Open Food Chain (OFC), an open public blockchain platform that connects the entire food industry from farm to fork. OFC offers immediate cost savings by bringing transparency to product origins and validating claims like food safety and sustainability. It also facilitates deep optimization processes in supply chains through its basic interoperable infrastructure for safe and easy data sharing. OFC is already live and operational with several multinationals using the system. OFC is being implemented in juice, olive oil, shrimps, cacao and with chefs.

Open Food Chain's architecture makes it highly scalable, interoperable, and efficient. Transaction costs are non-existent, and payments are made only for the initial connection and ongoing maintenance of the system. Together with industry leaders, research organizations, and tech experts, OFC is poised to become the new standard for a transparent and efficient food ecosystem. The \$OFC token is designed to make the entire OFC ecosystem self-sustaining without a central authority, making it unstoppable.

The current state of the food system is unacceptable, and we need radical solutions to address the numerous issues facing it. OFC is an innovative and practical solution that brings transparency and efficiency to the food industry, addressing the challenges faced by the sector. It is a promising solution with the potential to revolutionize the food ecosystem and reconnect consumers with efficient supply chains.

2. Why Open Food Chain?



Open Food Chain (OFC) is working to address these issues by connecting the entire food industry from farm to fork through an open public blockchain platform. OFC offers clarity on product origin and provides credibility to claims like food safety and sustainability, resulting in immediate cost savings for participants.

OFC kickstarts deep optimisation processes in supply chains and is highly scalable, interoperable, and efficient. With no transaction costs, endless volumes can be traced without affecting costs. OFC is an operational solution for several multinationals with a collective turnover of 25+ billion euros, and its first implementation, Juicy Chain, is currently uniting over 50 companies in the juice industry.

2.1. Problems in search of a solution

In 2016, Marieke de Ruyter de Wildt began exploring ways to increase data reliability and stumbled upon blockchain. This discovery gained momentum in 2017 when the first food and blockchain meetup, which attracted a global network of over 2,000 professionals working in food and tech, was held in Amsterdam. Each month, participants discussed a real-life case from the food industry.

In 2018, this meetup transformed into the first [accelerator](#), where agrifood firms collaborated to create the technology-enabled future of food. The Summit was financed by the Dutch Ministry of Agriculture, as well as notable companies such as Ahold Delhaize, Deloitte, and IBM. The summit's focus was on real-world issues with clear problem owners. The event was divided into three parts of the food system: consumers, supply chains, and farmers.

After five events, it was evident that all aspects of the food system were affected by decreasing consumer trust, high waste levels, and a focus on inexpensive food instead of healthy food. Chapter two will delve into how Open Food Chain can help alleviate these challenges.

2.2. Low consumer trust as fraud increases

Consumer trust in the food industry has reached an all-time low. The Food Marketing Institute has stated that the most significant trend in the food industry is the growing demand for transparency, with 94% of shoppers desiring more information about the products they purchase. In the survey, consumers stressed the importance of transparency in terms of providing comprehensive information on food and how it is produced. This call for transparency stems from a desire to combat fraud, as noted by other consumer research agencies globally.

Deception for financial gain in the food industry is alarmingly high and encompasses any intentional alteration of food, its packaging or labelling. As per studies, roughly 20% of products sold have inaccurate labels. The financial repercussions of food fraud are massive, with estimates ranging from 30 to 40 billion dollars annually, affecting the global food market.

Such deceit leads to several issues, the foremost being food safety concerns and product recalls, thereby leading to economic losses. Foodborne diseases affect around 600 million people, roughly one-tenth of the world population, which is a significant concern. The costs of product recalls can lead to substantial expenses, with an average of \$10 million, along with damage to a company's reputation. Consequently, there is an increased pressure on the food industry to be more transparent and forthcoming about their origin and supply chain management.

2.3. One third of our food does not reach a plate

Annually, an astounding 1.3 billion tons of food is discarded, which constitutes about a third of all food produced. It is believed that food waste is responsible for generating 8-10% of global greenhouse gas emissions. Furthermore, it has a significant economic impact, costing approximately \$1 trillion per year. The problem of food waste arises at every stage of the food supply chain, ranging from the producer's fields to transportation to markets or storage facilities, and to shops, restaurants, canteens, and homes. The issue is due to the inefficiency in food production and distribution systems, and it has become a complex and universal predicament.

2.4. Nutritional values are lost

Obesity has emerged as a significant issue in our food system. It has overtaken hunger as the most pressing nutritional problem globally. Although the prevalence of obesity varies by location, it is ubiquitous. According to the World Health Organization, obesity is now a pandemic, and every year, at least 2.8 million people die as a result of being overweight or obese.

All countries are experiencing an increase in obesity rates, which is attributed to the consumption of cheap processed foods that are high in added sugar, fats, and salt. These foods are packed with calories but low in essential micronutrients. Our food is also becoming less nutritious, and information about the nutrients it contains is difficult to obtain, while health claims are often not backed by evidence.

3. How does Open Food Chain work?



Open Food Chain is a solution that directly caters to the needs of agri-food companies. We will demonstrate how it tackles critical issues such as transparency, waste, and nutritional value by using the juice industry as an example. Additionally, we will elaborate on the innovative and well-tested governance model that ensures the solution's wide acceptance across the industry.

The roadmap clearly indicates that transparency is only the first step in creating an efficient supply chain and fostering a stronger connection between consumers and the food system.

3.1. Juicy Chain Case Study

Juicy Chain is a practical implementation of the OFC designed to promote sustainable juice production. It is overseen by the Juicy Chain Foundation, a non-profit organization established by Refresco and Eckes Granini, and backed by the IDH Sustainable Trade Initiative. The purpose of Juicy Chain is to establish a collaborative data infrastructure that openly communicates the sustainability claims of each participant in the juice supply chain, from the farm to the retailer. Sustainability claims are added by participants at various stages of the supply chain, as depicted in the diagram below. All information about the product, including its origin and the various steps in the supply chain, is accessible to everyone, including customers. Additionally, all information is verifiable by anyone. For a brief video explanation, [click here](#).

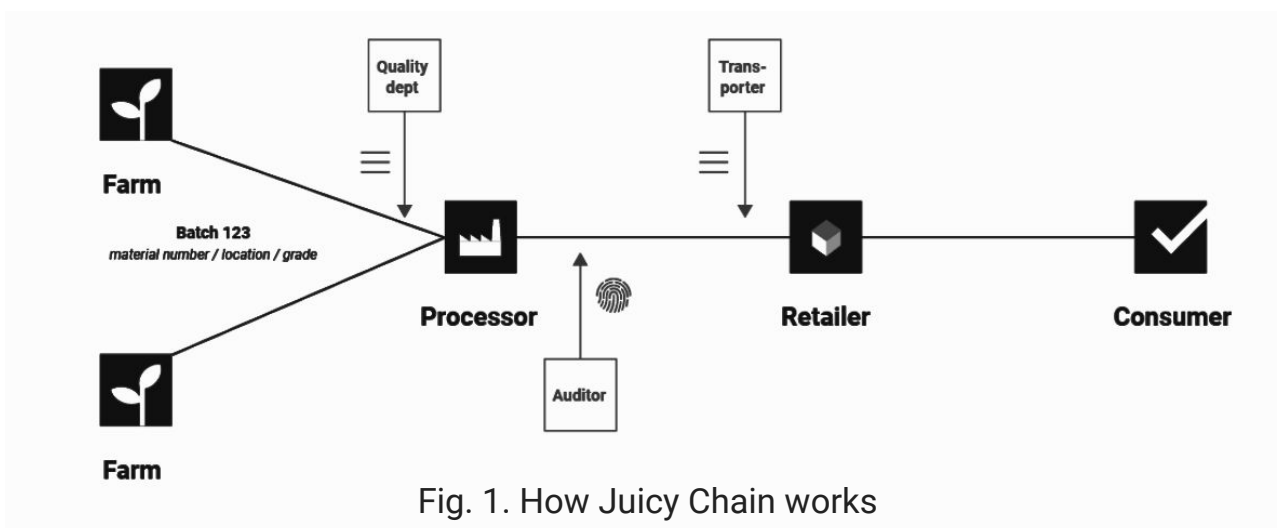


Fig. 1. How Juicy Chain works

The implementation of Juicy Chain brings about transparency in the supply chain, which in turn leads to increased consumer trust and reduced likelihood of fraud. Juicy Chain enables participants to share real-time data on volumes and sustainability claims throughout the supply chain. This ensures that false certificates are easily identified and the concerned participant is excluded from further participation. The use of lab results and real-time data enables processors to accurately assess volumes and optimize processing, thereby reducing waste levels.

Compared to traditional methods where batches are only assessed upon arrival at the collection point, Juicy Chain enables assessments to be conducted at the farm gate with the help of lab results. Additionally, all sorts of claims, including information on micronutrients, can be shared in Juicy Chain. This means that product information can be shared with consumers, allowing them to see the nutritional value of their apple juice.

3.2. Governance structure

The OFC operates with a dual-tier governance structure, which is a vital aspect of blockchain network development. Governance plays a critical role in determining the success of such networks. The OFC comprises two governing bodies, namely the OFC foundation and industry-specific autonomous foundations such as the Juicy Chain foundation, which oversee the main infrastructure.

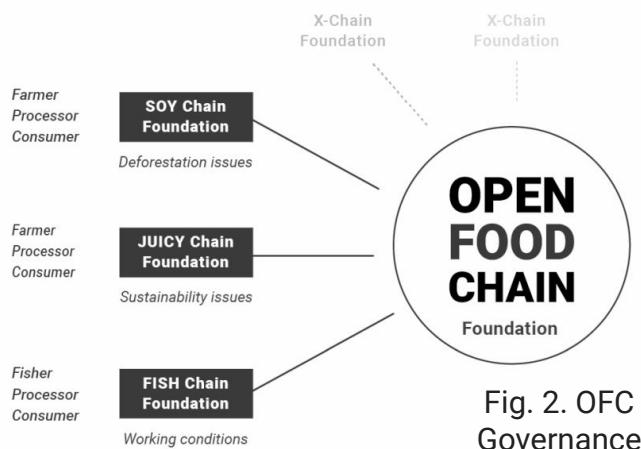


Fig. 2. OFC Governance

Open Food Chain foundation

The OFC foundation, headquartered in The Netherlands, serves as the governing body responsible for establishing strategies and implementing operations for the OFC main net. The board convenes at least four times annually to establish strategic objectives and address emerging issues. Board members are selected based on the following criteria:

- Profound knowledge of food industry innovation
- Extensive network to facilitate rapid adoption
- Forward-looking perspective on the future of food

While the first OFC board was established in a centralized manner, future iterations will be selected through a democratic process. The OFC foundation aims to accelerate the adoption of industry chains in relevant supply chains, with the following planning:

Year	Industry
2023	Juice, Olive Oil, Shrimps, Cacao and Chefs,
2024	Sugar, Soy, Coffee, Fish and Restaurants

The Open Food Chain foundation collaborates with various essential industry partners to establish these new industry foundations and their supply chains.

Industry Chain Foundations

The main OFC blockchain is accompanied by countless side-chains, each dedicated to

a specific food industry. These side-chains include Juicy Chain, which focuses on the juice industry and has its own foundation, and Soy Chain, which concentrates on soy and also has its own foundation. This separation is essential because each industry has distinct stakeholders and concerns. In the juice industry, a shared challenge is to demonstrate progress in sustainability, as set out in the juice covenant. Meanwhile, the primary concern in the soy industry is deforestation.

3.3. Competitive Analysis

Back in 2016, Walmart and IBM collaborated to establish a proof of concept for tracking the origin of mangoes sold, which was one of the early blockchain applications in the food industry. Since then, various blockchain projects have tried to develop solutions for the industry with varying degrees of success. Nonetheless, no universal industry standard has been established yet. OFC possesses multiple features that could potentially position it as the go-to industry standard.

Differentiators:

We evaluated numerous projects that aimed to enter the food industry and analyzed their advantages and drawbacks. Notable examples include Vechain, which provided a SaaS solution; ToolChain, implemented by Walmart; IBM Food Trust, which provided a comprehensive platform based on Hyperledger; and Origintrail, which was adopted by the South-European poultry market. These are just a few of the many blockchain initiatives for the food industry that were considered during the OFC's design. However, the OFC distinguishes itself by three main differentiators:

1. **Interoperability:** The food industry has a reputation for being resistant to adopting new technologies, so it was crucial that the OFC provide a smooth and efficient onboarding experience. To achieve this, the OFC has been designed to be fully interoperable with existing data systems, and users can easily onboard onto their own accounts. This simplified onboarding process helps to speed up adoption of the OFC within the industry.

2. **No transaction costs on volumes:** The cost of transactions has been a significant obstacle to the adoption of Blockchain in supply chains, especially for those that deal with high volumes of transactions. The OFC has been purposely designed to eliminate transaction costs for food industry partners. To participate in their respective industry blockchain as an active member, industry partners can lock \$OFC tokens on the main chain, which can be cashed out at any time if they decide to leave. Additionally, partners only pay the bare minimum for maintenance, which is shared among all food industries. No costs are incurred based on transaction volume.

3. **User Owned:** One of the key benefits of Open Food Chain is that the data that enters the chain is entirely user owned. This is the inherent advantage of building an open public digital infrastructure with a focus on decentralized governance - companies that use an OFC industry chain will assume responsibility for the data they enter into it. A good and fair governance model serves to both allow participants to work independently, work together and work within the rules that are set for the chain. This includes veracity and fairness of data.

3.4. Roadmap

Our latest roadmap outlines our targets until 2025, grouped into four categories. One of our key focuses is onboarding, which aims to increase transparency and consumer trust in the OFC industry adoption. The COVID-19 pandemic has accelerated the digitisation of the agrifood sector, with companies like Harvest House and Nature's Pride adopting ERP systems for the first time. This has created a greater need for transparency in the industry.

To achieve this, we aim to launch the OFC in all key industries within the next two years, making it the new standard for transparency. We plan to onboard six new industry chains in 2023, including five that have been identified in the Accelerator and one that was suggested by new board members. Of course, this timeline is subject to change based on new opportunities or pressures that arise. While this may seem ambitious, we've been working on this for five years and are confident in its feasibility. Our board's top

priority is to evaluate the roadmap and seize emerging opportunities to achieve our goals.

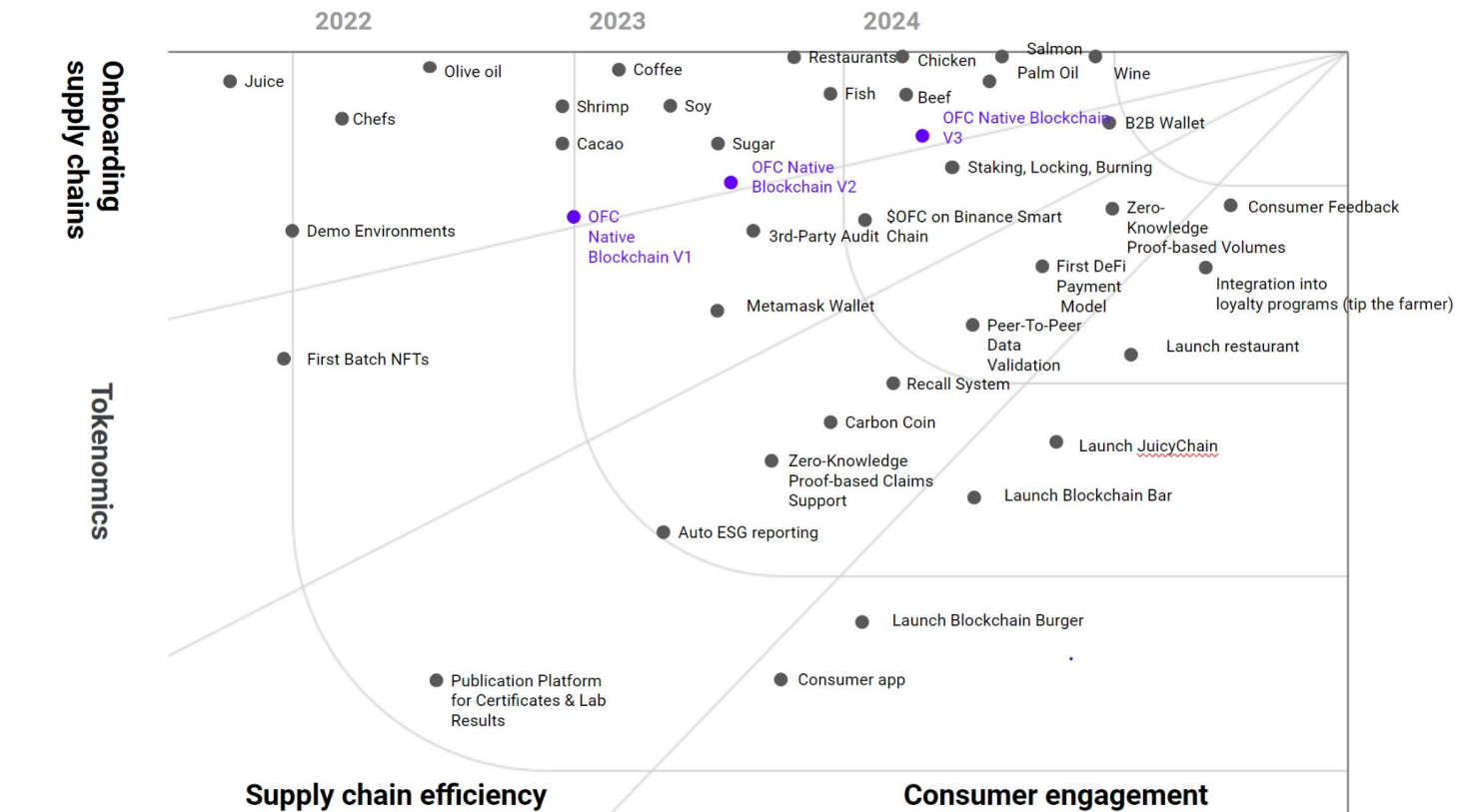


Fig. 3. Roadmap

Tokenomics

The \$OFC token has a significant role in the OFC ecosystem, from the expansion of Open Food Chain to the creation and enhancement of new OFC features. To achieve this, we plan to list \$OFC on decentralized exchanges at the earliest opportunity, and on centralized exchanges no later than mid-2024. Chapter 4 outlines the comprehensive application of \$OFC.

Supply Chain Efficiency

The upcoming milestones of the roadmap focus on the technical aspect of OFC's development, aimed at achieving greater efficiency and optimization within the food industries. The main issues tackled by these features are waste reduction, which pertains to direct inefficiencies, and nutrition improvement, which deals with indirect inefficiencies. All these features are applicable to all food industry players.

Consumer Engagement

The final section of the roadmap outlines the plan to incorporate consumers into the OFC ecosystem. Although it is not the primary focus at the moment, the roadmap sets targets for integrating consumers into the OFC ecosystem. The first consumer application is expected to be available by early 2024. Ultimately, the goal of the OFC is to create a nutrition-oriented food system that caters to individual preferences and requirements.

4. What is Open Food Chain?



In this section, we will delve into the primary design and development decisions that shaped the Open Food Chain (OFC) - a blockchain solution created exclusively for the food industry.

4.1. Why Blockchain?

A consensus mechanism is an essential component of a blockchain that determines how a shared agreement on the current state of the network is reached. It is a viable solution for a group of participants that have no strong ties and want to arrive at a shared administration. Public blockchains are unique in that no single participant can dominate the network, and no trusted party is required. Therefore, they are the optimal choice for agreeing on industry standards.

4.2. Public infrastructure for technical strength and adoption

The OFC's commitment to the public design of its protocol is a fundamental principle of the project. By building the OFC as an open-source platform, we aim to foster collaboration and innovation throughout the ecosystem. Open-source software is renowned for its high quality, as the code is publicly available for reuse and review. This allows for quicker detection and resolution of issues or bugs. The public nature of the OFC protocol is crucial in promoting its adoption in the food industry. Often, stakeholders are required to rely on closed-source or proprietary traceability platforms, controlled by a single central party. In contrast, a public solution is not owned by any one entity, which can enhance trust among all stakeholders within the ecosystem. This principle is of utmost importance and underpins the OFC's mission.

4.3. A strong, efficient consensus mechanism

To enable the OFC blockchain to function as a public network, it requires a robust consensus mechanism. Our approach for the OFC combines multiple consensus mechanisms, including Proof-of-Stake (PoS), Proof-of-Work (PoW), and Delayed-Proof-of-Work (dPoW), to ensure optimal security. In blockchain technology,

consensus refers to the agreement among the network nodes on the current state of the network. To achieve consensus, at least 51% of the nodes on the network need to agree on the next global state of the network. The world's largest blockchain network, Bitcoin, relies on the PoW consensus mechanism for high-level security. However, there are different ways to achieve consensus:

1. **Proof-of-stake:** In the PoS consensus mechanism, the ability to mine or validate transactions is based on the number of coins held by the person. This implies that miners with more tokens have greater mining power. To participate in this network, stakers need to place a certain number of coins/tokens at stake on their nodes and receive rewards for fair mining. However, cheating puts their stake at risk.

PoS is a preferred choice for its effectiveness and energy efficiency. However, in a corporate setting, there is a risk of centralization. To prevent centralization, we have implemented two systems: Low difficulty PoW and DPoW.

2. **Low difficulty Proof-of-work:** Cryptocurrency networks like Bitcoin and Litecoin use PoW as a common consensus algorithm. In this mechanism, participants mine for a valid hash to be the first to serve a new valid block. However, the downside of using PoW is that it can lead to high energy consumption.

The idea behind PoW is that miners have a financial investment in the game, as they have to pay for energy. This incentivizes them to act honestly because dishonesty will result in a real loss of money. We chose to use PoW because it allows anyone to participate, regardless of their stake in the coin. This helps us to counterbalance the centralization effect we experience with our use of PoS.

3. **Delayed Proof-of-work:** OFC recognizes that smaller blockchains are vulnerable to various types of attacks. To address this, we utilize a security mechanism called dPoW, which was created by the Komodo team. This hybrid consensus method leverages the hashing power of a secondary blockchain to provide additional security to the primary blockchain. By using dPoW,

OFC can maintain a scalable multi-chain network of niche blockchains while maintaining a high level of security.

The notarisation process is a critical component of the OFC's security infrastructure, with cycles occurring every ten minutes. The blockchain's history is notarized into the Komodo main chain every ten minutes, assuming constant activity. This notarization is then pushed through the notarization process into the Litecoin blockchain to enhance security further. Notary Nodes, which are elected by the Komodo community and supported by the Komodo team, provide dPoW services. They create a notarization of a digital fingerprint (a hash) of the blockchain in question and write it into the Komodo main chain (KMD). These actions are then recorded in the blockchain itself, enabling the blockchain to locate its most recent notarization. We employ dPoW to provide maximum security for all of our chains to ensure data immutability and safeguard the ecosystem's value.

4.4. UTXO-based tracking

Our blockchain design stands out from other provenance blockchains due to the unparalleled transparency provided by UTXO logic. UTXO logic operates similarly to cash in that it consists of fixed denomination notes that are accumulated to determine the balance. Like a cash register, you can only spend the notes you have and receive change if necessary. The payments, settlement, and registration all follow the same process, ensuring that the administration is always in line with the settlements, which are visible to everyone. In essence, the UTXO logic in a blockchain environment creates a fully functional transparent triple-entry accounting system.

Triple-entry bookkeeping is considered the ultimate goal of all accounting theories and is an improvement on double-entry bookkeeping. It is a system in which all accounting entries are cryptographically sealed by a third entry, i.e., the blockchain. As a result, it serves as a deterrent against manipulations and financial fraud. In other words, the total balance of the blockchain's bookkeeping will always be in balance, ensuring the utmost accuracy and reliability.

Therefore, every wallet on the blockchain must also be in balance. This is the accounting system that Bitcoin was the first to implement. UTXO logic makes Bitcoin more transparent, auditable, and efficient compared to traditional financial systems. Each UTXO is uniquely referenced by its transaction ID and index. Open Food Chain was designed using UTXO logic for various reasons, including:

1. **Scalability**, as transactions can be processed in parallel.
2. **Interoperability**, as one-time objects are simple to work with.
3. **Predictable Costs**, with no need for gas calculations.
4. **Security and Privacy**, with one-time objects and logic based on conditions.

We consider the UTXO-based foundational layer of transparent proofs and claims to be a strong starting point, as it can easily integrate with any platform that uses standard tooling. For instance, if there is a need to connect with an Ethereum-based application, UTXO-based proofs can be integrated into their smart contract layer, enabling interoperability with other blockchain protocols while maintaining a high level of transparency.

4.5. Data Model

The data structuring process is of utmost importance in a blockchain network that interacts with numerous stakeholders providing their secure data. In the case of the OFC, we have developed a comprehensive approach that entails various stages of data gathering, processing, and structuring.

Data processing

Producers, suppliers, farmers, and other players generate a vast amount of data that must be organized in the blockchain. Open Food Chain handles this by collecting and processing data in two ways. First, a process called "batching" groups data into

report-form from different ERP systems, which is automated to maintain a continuous flow of data. Second, unique data not included in the batch data can also be directly fed into Open Food Chain for timely processing. The batch data is processed by a script called "block-notify," which creates wallets, sends transactions, and publishes public data to the API. To ensure data accuracy, certain information must be shared with the network, such as the Purchase Order (PO) number and position (if applicable), which are vital for batch matching.

GS1 Global Standard

GS1 is a non-profit, neutral organization that governs a series of standards for identifying products. These standards are widely used and act as a common language for identifying product batches where applicable. The use of GS1 standards in the OFC application can positively impact process efficiency by providing more clarity and reducing errors. While it is encouraged to use GS1 standards within the OFC, it is not mandatory for its functioning. The main GS1 standards used in the OFC are the Company Prefix, GTIN-14, and GLN.:

- GS1 Company Prefix: Company identifier (6 to 9 digits)
- GTIN-14: Identifier for wholesale shipments (14 digits)
- GLN: Location Reference (13 digits)

To avoid conflicts with duplicate PO numbers, we encode them into unique identifiers using the GS1 company prefix of the customer, who is the issuer of the PO number. The GS1 Company Prefix is a unique identification issued by GS1 US. The supplier and customer must agree on the exact company prefix used. In the Open Food Chain, these data points are necessary for batch matching:

Purchase Order Number	Customer GS1 prefix (or customer name)
Purchase Order Position	Batch or lot number

In the world of data, alphanumeric characters are the norm, with each cell being of a specific type - string, integer, date or decimal. In cases where the data type is more complicated, these types can be broken down into their basic elements and then reassembled as on-chain data via multi-send transactions.

Claim freedom

The data structure displayed above indicates that participants can include unsanitized claims containing any data they deem necessary to timestamp and permanently store as proof for future reference. Examples include lab test results, audits, or nutrient information. Since participants operate their own nodes, they have the autonomy to choose whether or not to save any claims on the blockchain. Another benefit of these custom proofs is that any external platform, website, or application can simply access the wallets and transactions (UTXOs) through the available public API without any limitations or need to request access to a virtual machine.

Data pipeline

The path through which batch data travels from the actor to the blockchain is referred to as the data pipeline. These pipelines are known as Open Food Chain “Customer Edge Services” (OFC-CES). The OFC-CES is the point at which data from the organization is transferred to the public blockchain data. The pipeline always remains private and within the OFC-CES. Open Food Chain employs multiple data pipelines:

- HTTP API pipeline: This pipeline is used when the ERP system is capable of exporting the data into web-friendly formats or file uploads.
- Email pipeline: This is used when the customer has a more manual or spreadsheet-based internal process.
- FTP pipeline: This pipeline is used when the customer wants to push export files to our FTP servers or when the customer wants to push export files to their managed FTP servers and for the OFC to pull the data.
- MQ pipeline: This pipeline is used when the customer has a more sophisticated internal process.

Pipeline documentation

The CES that face the customer are developed using the go programming language, known for its speed and efficiency, and equipped with libraries designed to meet any data transformation needs. Each pipeline is implemented with a specific approach to perform the underlying data transport technology. The process starts with the customer data ingestion at the edge and ends with the blocknotify processing completion. All public data is immutably stored in the blockchain and can be accessed through explorers' APIs for developing hosted services such as product journey applications.

Shielding private data

Although our infrastructure is accessible to the public, it is important to note that not all data is available to everyone. To maintain privacy, stakeholders who possess sensitive information can make use of shielded chains that employ Zero Knowledge Proof technology. This technology helps to protect the sender, receiver, and the amount transferred, while also ensuring proper management of the data.

Decentralised Key Value

The decentralised key-value (KV) store is a valuable tool for transmitting public data directly between peers in an asynchronous manner. This data can be encrypted and will continue to be protected while being stored on the KV blockchain. Even though it is visible on the public blockchain, it remains encrypted. The KV provides an affordable storage option for temporary data, and every participant is responsible for their own data entries. These data entries serve as an address book, indicating to other participants where specific transactions can be directed.

Longer-lasting data

When it comes to data that needs to be stored for an extended duration, like

organisational information or organisation type, Open Food Chain makes use of on-chain oracles. These oracles are managed by the full node and are within the control of every participant. Oracles provide greater flexibility than the basic KV store and are slated for inclusion in upcoming versions.

4.6. Interoperability

As we have previously discussed, interoperability is a significant challenge for many traceability platforms. However, the OFC has prioritized interoperability and backward compatibility with existing supply chain software infrastructure, from ERP systems to barcode scanning. Additionally, the OFC has been designed to be interoperable with other blockchain platforms, generic wallets, DEXes, and exchanges. It is worth noting that the OFC is compatible with the AtomicDEX protocol created by the Komodo team, which enables it and its industry-specific chains to exchange assets and data with almost any public blockchain platform without needing a broker.

To establish a transparent supply chain record, the OFC relies on linking with ERP systems. This linkage does not have to be active or online, and batch processing can be triggered by events such as shipping or production. For each organization, its full node is crucial for processing its data. By using a private key (passphrase), an organization can encode all data that will be processed, generating new keys for future transactions. Integrating farmers and smaller actors into the supply chain is more difficult, despite the fact that their data is extremely valuable. However, the OFC has tackled this challenge by developing a lightweight node that can operate on a mobile phone, thereby enabling smaller actors to participate in the supply chain.

4.7. Batch matching

Now that we have discussed all components, the following graphic visualises the entire batch flow within Open Food Chain. The black arrows show the data entry flow into the blockchain, and the red ones show the data lookup and batch matching.

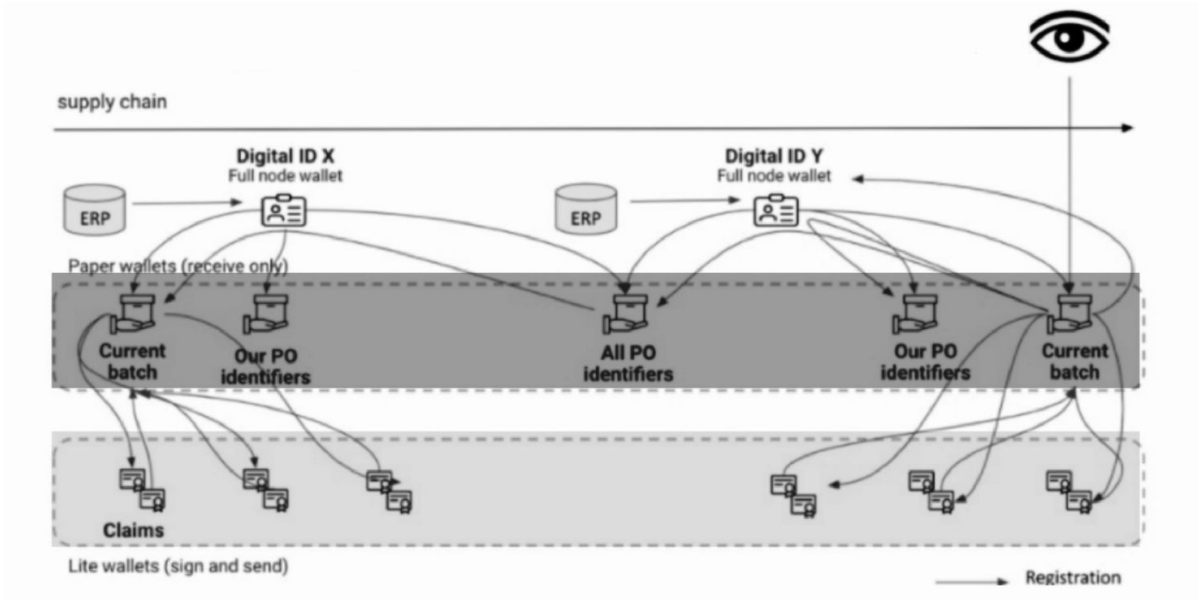


Fig. 4. Data Model

The cornerstone of batch matching is the PO identifier, which is recognized by both the supplier and the customer. Each party independently associates the PO identifier with their respective batches and identity. Due to its uniqueness, an observer can accurately match batches using the PO identifier. Consequently, if a match is found, it can only be linked to the corresponding batches.

Example

A bottle of apple juice is associated with a bottler batch, also known as the current batch. By examining the bottler's identity (ID Y), the connected claims, and the corresponding PO identifiers, an observer can identify any matches by consulting the "All PO identifiers" wallet. If a match is discovered, it will be associated with ID X and will lead to the current batch of ID X. Furthermore, the observer can now view all the claims attached to the related batch(es) of ID X, which also apply to the apple juice bottle. Applying the same logic, multiple batches may contribute to the current batch of the bottler, and each can be distinguished in the same manner.

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4.8. Komodo Infrastructure

The Komodo team originated from a decentralised finance project on the NXT blockchain in 2014 and later learned the risks of depending on an API controlled by another team. This led to the creation of the Atomic Cross-Chain Asset Standard, which paved the way for interoperable and secure blockchains and digital assets. This technology formed the basis for the Komodo tech stack, which powers the OFC and all its industry-specific chains.

As a result, the OFC is both independent and interoperable, benefiting from the Komodo team's support and a strong core built on Bitcoin architecture, Zcash shielding, Litecoin security, Interledger crypto conditions, and Komodo advancements. It's worth noting that the OFC operates on its platform and not the Komodo blockchain, similar to how Linux powers specific distributions.

When it comes to transparency, a layer-one UTXO based setup like Bitcoin is preferable to an EVM-based setup like Ethereum. The transparency and immutability of the Bitcoin ledger aligns better with the needs of the agrifood industry, and the multi-chain setup provides industry flexibility, scalability, and interoperability while maintaining a simple design and clear partitioning.

Local API

To use the Open Food Chain solution, an organization must first clone the app server source code and connect it to their locally installed node. This allows them to have their own node environment, which comes with the added benefit of running their own local API. The current version of Open Food Chain runs on an application server that operates in parallel to the blockchain. The processing of ERP data to transactions is carried out within each participant's own secure and trusted environment.

Block Explorer

The block explorers provide a decentralised API for applications and websites to pull data. Like the application server, the source code for the block explorer is available for download and to connect to any locally running blockchain node.

Apps

The initial consumer application is accessible through a web browser and serves the purpose of showcasing the product's journey in a transparent manner. It retrieves blockchain data that has been saved by means of a decentralised and open-source API, and proceeds to track the batch data upstream along the supply chain. The OFC presents itself as an option for conducting audits, which can be executed by organisations in situations such as product recalls, or by NGOs that operate within certain industries and need to compile reports.

5. Token Utility

The native token of the Open Food Chain (OFC) ecosystem is OFC Token (\$OFC), which serves as a driving force behind industry adoption and a utility token-based economy in the food industry. It is launched on the Binance Smart Chain for the open side of the project, while industry-specific chains run on the Komodo infrastructure. The \$OFC token has two tested B2B utilities:

1. Users of the infrastructure - activated at public launch
2. Web3 service providers - activated in 2024/2025

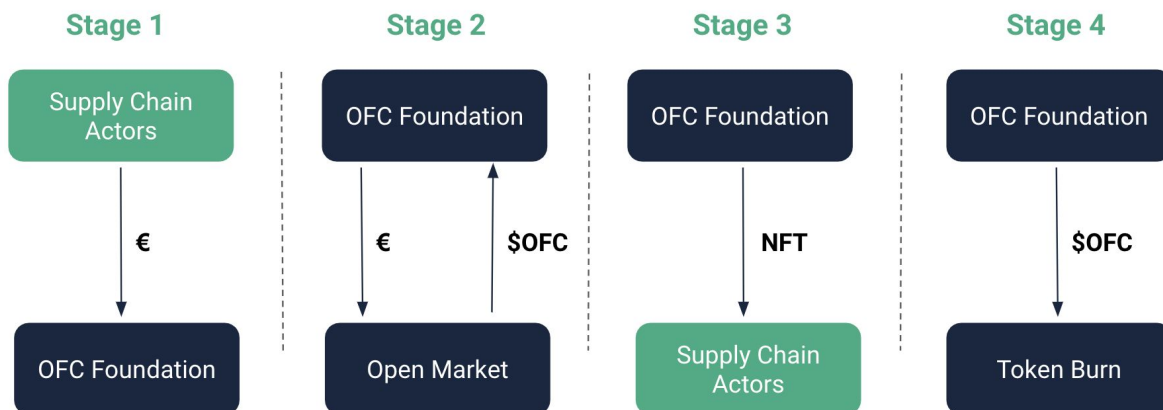


Fig. 5. Tokenomics Flow

5.1. Users

Users are supply chain actors

The core utility of the \$OFC token is supply chain governance. Participants that want to use one of the industry-specific satellite chains require an annual subscription priced at €20,000. This subscription entitles them to an access-NFT, which in turn grants them permission to write to OFC.

Out of the €20,000 subscription fee, half will be allocated by the OFC Foundation to acquire and burn tokens from the market. The remaining 50% will be utilized to cover service costs, used to facilitate seamless integration of the the participants with the Open Food Chain platform.

Tokens used on the industry chain, for instance \$JCC for Juicy Chain, are released by a faucet on a 'as needed' basis. The faucet checks the presence of the access-NFT in the wallet and the need for industry coins. These are then distributed to the node's wallets.

Most Agri-Food companies have no experience in creating and managing crypto wallets. The OFC Foundation will assist in the and allocate this to the wallet of the participant. This by-pass will be operational until agrifood businesses are buying tokens off the market directly.

NFT's are easier to understand and more reassuring than tokens. The network we've picked for these NFTs is BNB Chain. We can easily add other NFT platforms if needed as well. Currently, this process will be done manually. Due to the number of steps taken, a diagram is given below to allow for better transparency within the process. However, from 2023, it will be deployed through a smart contract. Until a DAO is in place, the OFC and industry foundations will manage the voting process.

5.2. Web3 service providers

An exciting utility of the \$OFC token is that it enables Web3 service providers on adjoining blockchain platforms to integrate with one or more industry chains. Service providers like:

- [Dimitra](#) AI-powered GIS for ecological sustainability compliance
- [Galapp](#) is a farm app that operates in Colombia
- [CargoLedger](#) digitizing bills of lading
- [Grassroots economics](#) financing farming
- [Lemonade](#) adequately funding and (re)insurance

Service providers buy tokens from the market and burn them for serviced access or transaction capabilities. This accelerates the digitisation of the agrifood sector and allows easy access to the agrifood industry for (web3) digital services and capital. With Zero Knowledge Proofs added to OFC in 2023, more options arise as viewing shielded data can be monetised.

For industry service providers, building with the OFC is advantageous because it provides access to the largest data infrastructure within the food industry. With Open Food Chain, the industry is now interconnected, and new applications can be developed using shared open data.

We expect various applications to emerge from the OFC platform, such as cross-platform and cross-blockchain finance, consumer loyalty programs, and independent data verification. All service fees related to these applications will be burned by sending them to an unspendable address that can be publicly verified. By burning the coins, they are effectively removed from circulation, which enhances the value of the token.
