

Potential of blockchain technology for the Emmentaler cheese supply chain

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Regulations or key stakeholders such as customers demand product traceability along a product's supply chain. The increasing length and complexity of supply chains make traceability difficult. The goal of this work is to analyze the potential of blockchain technology to address traceability challenges in the Emmentaler cheese supply chain.

Introduction

The need to maintain safety and quality requirements throughout the food supply chain has become a major challenge. During the last decades, the credibility of the food industry was much questioned after a series of risk incidents and scandals. A traceability system is the mechanism which guarantees that the movement of the products is known at any step of a product's journey.

The blockchain is a distributed ledger technology that runs peer to peer and consists of a time-stamped series of immutable and permanent records for each transaction. The recorded data is distributed between all nodes of the network, not requiring the management of the data by a third party as in centralized systems. Blockchain technology is said to have the potential to improve food traceability.

Approach

The object of this work is to discover and assess the potential of the blockchain technology for the case of the Emmentaler cheese supply chain. In a first step, interviews with the various players of the cheese industry are conducted in order to create a supply chain map and to gain a profound understanding of the processes involved. In a second step, the existing traceability challenges of the supply chain are identified and analyzed. In a last step, the research evaluates how the different challenges could be addressed by means of a blockchain and a solution framework is developed.

Results

The research provides an overview of the Emmentaler supply chain (figure 1) and identifies seven major traceability challenges within it: (1) lack of

association between cow and batch of milk; (2) lack of association between farm and cheese; (3) use of paper-based documentation; (4) lack of view of product journey and digital certifications; (5) missing connection between the different information systems of the supply chain players; (6) no possibility for the end customer to easily check product provenance and (7) lack of integration of customer feedback.

The conceptual discussion concludes that the traceability of Emmentaler cheese could be improved through the implementation of a blockchain solution compared to traditional means. The developed blockchain shows how the information related to traceability is stored in the blocks of the blockchain (figure 2). Based on this framework it would be possible to increase transparency within the supply chain for participating supply chain members and to provide the customer with access to the whole product journey. However, the application of blockchain technology in supply chains, especially with an end-to-end perspective, is still in an early stage.



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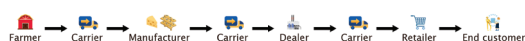


Figure 1. Overview of the Emmentaler supply chain

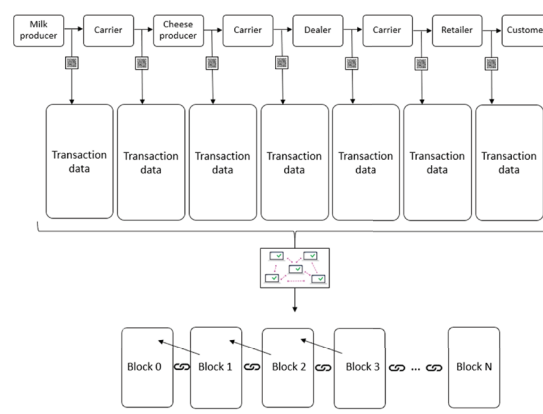


Figure 2. Proposed blockchain framework for the Emmentaler supply chain