

A Blockchain-based decentralized system to ensure the transparency of organic food supply chain

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Abstract

Low quality agricultural products are added to the market daily. Over usage of chemicals in the production process, use of uncertified chemicals and mechanisms for preservation and ripening processes, are the major issues that impact on agricultural product's quality as well as overall health of the consumers. Mechanisms to identify the quality of the agricultural products are highly demanded due to the lack of transparency in the current process. Blockchain technology is emerging as a decentralized and secure infrastructure which can replace involvement of a third party to verify the transactions within the system. The purpose of the research was to implement a Blockchain based solution to verify the food quality and the origin of the agricultural supply chain. A public Blockchain concept was selected instead of a private Blockchain in this study to ensure transparency by allowing any person to access the network. Instances of the smart contract were created for each physical product and deployed to Blockchain network. A Quick Response code which contained the address of the instance, was a reference to the virtual product. All the actors who are involved in the supply chain must be able to interact with the system to achieve the transparency. Each transaction and events related to a product is validated by peers of the Blockchain system. Product ownership was changed for each relevant transaction. A token-based mechanism was used to indicate the farmers' reputation with their products. Farmers could place a certification request regarding their products and, they can gain reputation tokens for each certification done by peers. A unique Quick Response code was used to identify each product within the supply chain. The proposed system has been implemented as a prototype and validated within the study.

Keywords: Agriculture, Supply chains, Food security