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# THEORETICAL MODEL FOR BLOCKCHAIN INTEGRATION IN A CONSTANȚA COUNTY AGRICULTURAL COOPERATIVE

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**Abstract**: This study proposes a theoretical blockchain model for agricultural cooperatives in Constanța County to improve traceability, transparency, and efficiency. Grounded in a meta-analysis of recent studies, the theoretical model outlines secure, export-oriented workflows that

## reduce fraud, optimize resources, and strengthen stakeholder trust.

#### • Introduction

Blockchain technology addresses key challenges in agricultural supply chains—transparency, traceability, and resource management. While widely discussed, its practical adoption remains limited in Eastern Europe, where cooperatives face fragmented land ownership and export compliance difficulties. Constanța County, with strong export potential via its maritime port, exemplifies this context. This study proposes a theoretical blockchain integration model tailored to local cooperatives, aiming to optimize operations and enhance supply chain

## • Results and discussions

### Key Insights from Meta-analysis

- Blockchain improves traceability, transparency, and efficiency in agri-cooperatives.
- Addresses issues like product fraud, fragmented land ownership, and export compliance.
- Enhances stakeholder trust and reduces resource misuse.

# **Strategic and Practical Value**

- Ideal for export-oriented cooperatives near ports (e.g. Constanța).
- Boosts logistics efficiency, documentation accuracy, and border clearance speed.
- Use-case: Farmers input data → sensors track conditions → QR-tagged batches → automatic payments if storage stays optimal.



- integrity.
- Material and method
- systematic meta-analysis A was conducted on peer-reviewed literature from 2009 to 2024, focusing on blockchain applications in agricultural cooperatives. Key databases—Web of Science, Scopus, IEEE Xplore, and Google Scholar—were queried using terms like "blockchain in agriculture" and "traceability blockchain." Studies were selected based on relevance to transparency, traceability, and efficiency in agri-cooperative contexts. synthesized Extracted data were qualitatively to develop a theoretical model tailored to Constanța County's

#### • Conclusions

The proposed theoretical blockchain model enhances transparency, traceability, and efficiency in agricultural cooperatives. When combined with IoT and smart contracts, it enables secure, automated, and export-ready operations. Constanța County's proximity to a maritime port reinforces the model's strategic relevance. While theoretical, the framework aligns with current technological trends and offers a foundation for future pilot implementation. Policy support and targeted investments are key to turning this vision

