Crypto-Foods : Blockchain-based Decentralized Food Ordering Service

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ABSTRACT

The proliferation of blockchain technology has spurred innovative applications across various industries, including the food delivery sector. This paper introduces Crypto Foods, a blockchain-based food delivery application designed to enhance transparency, security, and efficiency in food delivery processes. Leveraging blockchain's immutable ledger and smart contract capabilities, Crypto Foods ensures the integrity of transactions and provides users with unprecedented visibility into the food supply chain. This research outlines the architecture and functionalities of Crypto Foods, highlighting its potential to address key challenges such as food safety, traceability, and trust in traditional delivery systems. Furthermore, the paper discusses the technical implementation of Crypto Foods, emphasizing its decentralized nature and resistance to data tampering. Through a comparative analysis with conventional food delivery platforms, we demonstrate the advantages of Crypto Foods in fostering trust among consumers and stakeholders. Finally, we explore future directions for research and development in blockchain-based food delivery systems, underscoring the significance of Crypto Foods as a pioneering solution in this domain.

Keywords : Crypto Foods, Food Delivery Sector, Blockchain

I. INTRODUCTION

The emergence of blockchain technology has brought about a significant transformation in various sectors, including the food delivery industry. Blockchain, introduced by Satoshi Telemotor in 2009, offers a decentralized database solution that ensures secure and transparent transactions through cryptographic mechanisms. In recent years, the food delivery industry has witnessed remarkable growth, prompting the development of innovative blockchain-based platforms such as Bistro and Satilla. Bistro, established during the COVID-19 pandemic, facilitates direct communication between restaurants and customers,

offering benefits like reduced transaction fees and token-based payments. On the other hand, Satilla leverages Hyper ledger Sawtooth blockchain to address issues like food quality, high discounts, order manipulation, and lack of transparency. The integration of blockchain technology in food delivery platforms has revolutionized the industry by enhancing trust, efficiency, and transparency. Traditional centralized platforms have struggled with compromised data integrity and centralized control, whereas blockchain-based solutions provide decentralization, ensuring reliability and credibility. Comparisons between traditional and blockchain-based platforms highlight the latter's superiority in commission management, credibility, and server independence. Blockchain's decentralized nature ensures reliability and efficiency, making it an ideal solution for modern food delivery platforms. Research continues to explore blockchain's potential in improving food delivery services through smart contracts and decentralized applications. By addressing key challenges and enhancing transparency, blockchain transforms the food delivery landscape, ensuring better service quality and customer satisfaction.

II. WORKING OF BLOCKCHAIN

The emergence of blockchain technology marks a significant milestone in the ongoing evolution of the global business landscape. Historically, human societies have predominantly operated within centralized systems, characterized by the formation of various organizations, trade unions, and labor associations. This centralized model extended into the digital realm, where central authorities governed data and transactions. However, this centralized approach encountered several challenges, particularly concerning economic development.

A. Privacy Concerns: One prominent issue pertained to privacy, notably concerning user data concentrated within platforms like WeChat. The control over this information resided primarily with the platform operators.

B. Cost Challenges: Another issue stemmed from escalating costs associated with the expansion of network nodes. In response to these challenges, Satoshi Nakamoto introduced the concept of a peer-to-peer electronic cash system in September 2009. This groundbreaking proposal laid the foundation for blockchain technology, which gained broader recognition and exploration by enterprises around 2013 [2]. Blockchain technology represents a novel application of computer science principles, incorporating elements such as distributed data storage, peer-to-peer communication, consensus mechanisms, and encryption algorithms. At its core, a blockchain comprises a series of data blocks linked together in a secure and immutable manner through cryptographic techniques. This decentralized infrastructure facilitates the management and execution of transactions through smart contracts, which are programmable self-executing agreements encoded with specific conditions. The adoption of blockchain technology has spurred transformative changes across various industries, including the food distribution sector [3]. Traditional challenges faced by food distribution companies, such as issues with traceability and transparency, are being addressed through blockchain solutions. By leveraging decentralized networks and smart Fig. 1. Working of Blockchain contracts, stakeholders in the food supply chain can enhance efficiency, traceability, and security.
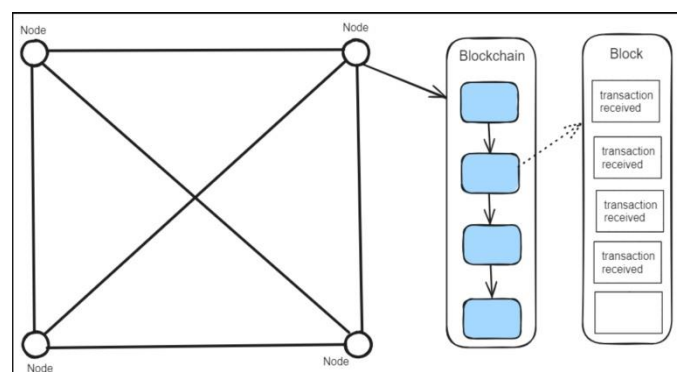

Fig. 1. Working of Blockchain

Despite economic fluctuations, the industrial sector continues to exhibit robust growth, underscoring the resilience and adaptability of businesses. With the proliferation of internet usage, particularly in China, online platforms have become integral components of the consumer ecosystem. This growth trajectory reflects a shift towards digital commerce models, where customers can directly engage with restaurants and vendors, benefiting from customized menus and real-time updates on prices and offerings. In this evolving landscape, platforms like Crypto Food are pioneering blockchain-based solutions to streamline food distribution processes, fostering transparency and efficiency while minimizing reliance on intermediaries. By enabling peer-to-peer transactions between producers and consumers, blockchain technology not only reduces operational costs but also enhances data privacy and security throughout the supply chain [4].

III. PROBLEMS

This research delves into the pervasive malpractices within the food delivery app industry, examining the business practices of existing platforms. It investigates hidden fees, unfair commission structures, misleading promotions, data exploitation, and service quality inconsistencies through thorough research and case studies. The paper proposes decentralization as a transformative solution, utilizing transparent smart contracts, fair revenue distribution, blockchain for privacy, and community governance to eradicate malpractices. It also suggests alternative strategies such as regulatory oversight, user education, and fostering competition for a comprehensive approach. The rise of food delivery apps has transformed dining habits, but concerns linger regarding fairness and transparency. This study aims to uncover and address malpractices impacting users and restaurants alike. Through real-world examples and case studies, it sheds light on systemic issues and advocates for decentralized solutions to rectify them.

A. Current Malpractices in Food Delivery Apps: Several research studies have highlighted prevalent malpractices within the food delivery app industry. These include hidden fees during checkout, unfair commission structures for partner restaurants, misleading promotions, data exploitation, and quality of service issues

B. Hidden Fees and Charges: Studies have shown that users often encounter hidden fees during the checkout process, leading to a sense of deception. Concealing fees until the final stages of ordering can increase order values and create a perception of affordability, benefiting the app's revenue stream.

C. Unfair Commission Structures: Partner restaurants often face significant financial burdens due to unfair commission structures imposed by food delivery apps. While maximizing profits for the app, these structures strain the profit margins of restaurants and may contribute to market dominance by apps with large market shares.

D. Misleading Promotions: Manipulative promotions and discounts can encourage excessive spending by users, boosting the app's average transaction value and fostering loyalty. However, the actual savings may be less substantial than perceived, benefiting the app's revenue stream.

E. Data Exploitation: Apps exploit user data without explicit consent to build detailed user profiles, enabling targeted marketing efforts and monetization opportunities by selling data to third parties.

F . Quality of Service Issues: Inconsistent service quality and longer delivery times may result from cost-cutting measures by the app. While this aids in market expansion, it can lead to user dissatisfaction and damage to the app's reputation. While these malpractices may provide short-term benefits, they can lead to long-term consequences such as user distrust and legal issues. Many food delivery apps prioritize transparent and ethical business models to build sustainable relationships with users and partners [5].

IV. SOLUTIONS

Crypto Food represents a pioneering blockchain-powered platform designed to revolutionize the food ordering process by connecting consumers directly

with restaurants, thereby bypassing traditional intermediaries. By leveraging blockchain technology, Crypto Food enhances transparency, security, and efficiency across the entire food distribution network. Through the implementation of peer-to-peer transactions between producers and consumers, the platform eliminates the need for intermediaries, fostering healthy competition in pricing and contributing to the increase of farmers' income.

Furthermore, the decentralized nature of blockchain technology enhances data privacy by distributing access and control. This ensures that sensitive information remains secure and accessible only to authorized parties, mitigating the risk of data breaches and unauthorized access.

While economic growth varies across countries, forecasts indicate a projected annual growth rate of 3.5 Challenges in app-based food delivery include maintaining food quality during delivery, addressing pricing strategies, and preventing manipulation of orders and user evaluations. Additionally, issues such as delayed deliveries and responsibility avoidance by delivery personnel and restaurants persist [6].

In a centralized take-out platform, human intervention compromises data authenticity, posing a significant challenge. Utilizing blockchain technology addresses these issues effectively. Blockchain, a decentralized database, ensures data integrity through interconnected blocks forming a distributed ledger. It enhances security and transparency, particularly beneficial in complex supply chains like the food industry.

Implementing blockchain in food delivery platforms offers several advantages:

· Supply chain reliability: Users can verify the authenticity and freshness of raw materials through blockchain.

· Commission distribution: Blockchain enables seamless, direct payments between food delivery staff and restaurants, eliminating intermediary costs.

· Safety standards enforcement: Blockchain tracks all activities by delivery personnel and restaurants, aiding in regulatory compliance and reducing payment delays.

· Trust and transparency: Blockchain resolves trust issues among stakeholders by providing transparency and decentralization.
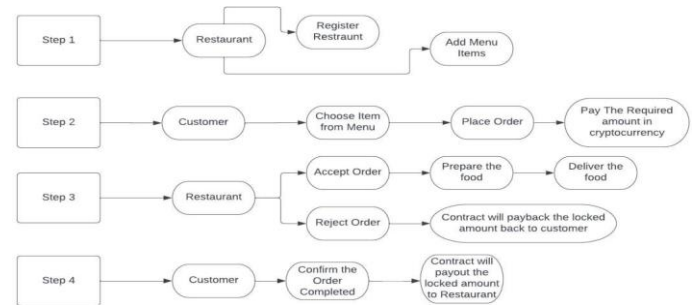

Fig. 2. Working of Crypto foods

A. Platform Workflow:

· Supplier Registration: Local farmers, food producers, and restaurants can register on the blockchain network as suppliers. They provide details about their products, sourcing practices, pricing, and delivery options. These details are stored on the blockchain as smart contracts.

· User Registration: Customers create accounts on the platform, providing their preferences, and payment information. User profiles are also stored as smart contracts on the blockchain.

· Smart Contracts for Ordering: When a customer places an order, a smart contract is created on the blockchain. This contract includes details of the order, delivery address, and payment terms. The contract may also include predefined conditions, such as delivery time frames.

· Payment and Escrow: Payment for the order is held in escrow on the blockchain. The funds are released to the supplier only when the customer confirms receipt and satisfaction with the order. Smart contracts handle the automatic release of funds upon fulfillment of the contract conditions.

· Order Acceptance: On acceptance of the order, the restaurant will prepare the order followed by its delivery, and if rejected, the contract will pay back the

locked amount to the customer. Order Confirmation: The customer will have to confirm the order acceptance, and the contract will pay the locked amount to the restaurant. By leveraging blockchain, food delivery platforms can enhance efficiency and trust within their ecosystems [7].

B. other Strategies to Overcome Malpractices:

A Holistic Approach Regulatory Oversight: Regulatory oversight, advocated by authoritative bodies like the Federal Trade Commission (FTC), acts as a bulwark against deceptive pricing and unfair commission structures. Visual representations of regulatory frameworks can illustrate how they deter malpractices and ensure compliance, contributing to a trustworthy and accountable food delivery ecosystem.

User Education: Proactively educating consumers empowers them with the knowledge to navigate food delivery apps effectively. Visual aids, such as infographics, can highlight key aspects like pricing models and data privacy, enabling users to make informed decisions and hold apps accountable for their practices.

Fostering Healthy Competition: Encouraging competition among food delivery apps prompts innovation and improved service quality. Graphical representations of market dynamics emphasize the importance of choice and the impact of competition on driving fair business practices and user satisfaction.

Government-Industry Collaboration: Collaboration between regulatory bodies and the food delivery industry can lead to the development of industry standards and ethical guidelines. Visual diagrams showcasing partnership frameworks demonstrate a shared commitment to creating a fair and transparent food delivery environment. Public Awareness Campaigns: Public awareness campaigns initiated by regulatory bodies and consumer advocacy groups can highlight key issues like hidden fees and data privacy concerns. Infographics and posters reach a wider audience, fostering collective demand for ethical practices.

In conclusion, a holistic approach to overcoming malpractices in the food delivery app industry involves regulatory oversight, user education, fostering healthy competition, government-industry collaboration, and public awareness campaigns. By integrating these strategies, the industry can evolve toward a more ethical and user-centric landscape, where transparency, fairness, and accountability are paramount.

Addressing Problems through Blockchain Integration:

· Data Security: Blockchain offers decentralized and secure data storage, reducing the risk of breaches.

· Transparency: Its immutable ledger allows users to track their orders, building trust.

· Payment Security: Integration of cryptocurrencies and smart contracts ensures secure transactions. · Supply Chain Traceability: Blockchain tracks the origin of ingredients, enhancing transparency.

· Fraud Reduction: Smart contracts automate processes, reducing fraudulent activities.

· Eliminating Intermediaries: Peer-to-peer transactions cut costs for customers and restaurants.

· Loyalty Programs: Transparent blockchain systems enhance loyalty program integrity.

· Reviews and Ratings: Immutable systems maintain feedback integrity, fostering trust.

V. CONCLUSION

1) Data Security Enhancement:

· Integration of blockchain has significantly improved data security in the food ordering process.

· Decentralized storage and encryption techniques ensure that customer information remains secure and tamper-proof. [6].

2) Transparency in Supply Chain:

· Blockchain enables a transparent and immutable ledger, allowing users to trace the entire supply chain of their food orders.

· Enhanced visibility into the origin and handling of ingredients promotes trust and accountability.

3) Secure and Efficient Payment System:

· Cryptocurrency integration has streamlined the payment process, providing users with a secure and fast transaction experience.

· Smart contracts automate payment procedures, reducing the risk of fraudulent activities.

4) Fraud Prevention Through Smart Contracts:

· The implementation of smart contracts has played a crucial role in preventing fraud at various stages of the food ordering and delivery process.

· Automated and self-executing contracts ensure trust and reliability.

5) Cost Reduction by Eliminating Intermediaries:

· The elimination of intermediaries, such as banks and payment processors, has resulted in cost savings for both customers and restaurants.

· Peer-to-peer transactions facilitated by blockchain technology contribute to a more efficient and cost-effective system.

6)Transparent and Tamper-Proof Loyalty Programs:

· Blockchain provides a secure platform for creating transparent and tamper-proof loyalty programs.

· Users can trust the accuracy of reward points and easily redeem them within the system.

7) Improved Customer Feedback System:

· The use of blockchain ensures the integrity of the customer feedback system.

· Reviews and ratings are securely recorded on the blockchain, enhancing the reliability of user-generated content.

8) Potential for Industry-Wide Adoption:

· The success of Crypto Foods demonstrates the potential for blockchain-based solutions in the food industry.

· As awareness grows and technology matures, similar platforms may be adopted on a larger scale.

9) Areas for Further Research:

· Identify potential areas for further research, such as scalability challenges, regulatory considerations, and user education on blockchain technology.

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