Research on Application of Blockchain Technology in Intra-city Express Terminal Service

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Abstract: In 2020, in the process of fighting against the 2019-nCoV, "intra-city express service " has become an important channel for people to obtain daily necessities.However, this poses a great challenge to the logistics industry, highlighting the short board of China's logistics distribution terminals.The logistics system in China needs to be optimized,Improving the ability to cope with emergencies.The main measures are to couple the block chain technology with "intra- city express service", establish a comprehensive and guaranteed distribution system, and effectively reduce the logistics cost.The purpose of these studies is to provide reference for related research.

1. Introduction

Since ancient times, public emergencies continue to challenge the level of human response.Infectious diseases, in particular, have been puzzling mankind.No matter plague and cholera in ancient times or SARS (2003), avian influenza (2004) and H1N1 in recent decades Flu (2009), European E. coli outbreak (2011) and Ebola outbreak (2015) in West Africa have constantly challenged the level of human emergency response. Especially in early 2020, New Coronavirus (2019-nCoV) had a great impact on the society[1].In the logistics industry, more than 90% of the revenue of the logistics industry declined, mainly resulting in the following losses, as shown in Table 1[2].However, the profits of some logistics companies have increased, that is, the intra-city express service industry, which is popular for door-to-door delivery, group buying and low price[3].

Table 1: losses faced by logistics enterprises under the influence of 2019-nCoV.

First level indicators	Secondary indicators	Impact index
Apparent cost	Employee salary	15.7
	Employee social security	5.5
Hidden cost	Site rental fee	40.3
	Enterprise tax	10.2
	Equipment leasing and idle	19.6
	Accounts receivable can not be recovered on time	4.3
	Bank loan interest	4.2

2. Development and Application of Blockchain Technology

2.1. The Concept and Characteristics of Blockchain

Blockchain is a distributed shared ledger[4],It is an important concept of bitcoin, and its essence is a database which is composed of data blocks[5].Blockchain involves mathematics, cryptography, Internet, computer programming and other science and technology, and takes distributed database as data storage unit[6]..It uses the distributed application architecture, namely peer-to-peer (P2P) network, as the means of communication and transmission, uses cryptography to generate data blocks and determine the ownership and privacy, and uses consensus mechanism to ensure the consistency of data blocks, aiming to build an honest and transparent value exchange system without trust[7].Its main characteristics are decentralization, pluralism, sharing and transparency[8]

2.2. Research Status of Application of Blockchain Technology in Logistics

Paper[9]It points out that blockchain technology reduces the cost of EDI in port logistics and it improves the degree of information transparency.At the same time, blockchain technology is traceable, which can prevent and control the transportation of goods, and realize the claim of lost or damaged goods.In addition, the blockchain technology optimizes the transportation route of port logistics by itself; specifically, the blockchain simplifies the docking mode and further simplifies the container transportation process.Paper [10]points out that blockchain has the function of anti-counterfeiting and traceability in fresh food logistics to ensure the standardization of fresh product transportation.The blockchain can effectively monitor the whole process of fresh product circulation and ensure that the cold chain logistics link of fresh products is transparent and traceable, and the data information is not tampered, so as to realize efficient information management and data sharing.The paper [11]points out that the blockchain effectively provides the benefit connection mechanism of "clear rights and responsibilities, benefit sharing, risk sharing and credit rating" for agricultural products, and improves the quality of mutual trust.In fact, blockchain is a decentralized mechanism based on big data and Internet,Its application in logistics can effectively improve logistics efficiency, reduce costs, and improve consumers' trust in suppliers and third-party logistics.However, there are still some problems in the mechanism construction of block chain in logistics supply chain.

3. Analysis of Problems and Reasons of Intra-city Express Service

Due to the fast pace of urban life and the influence of COVID-19 (2019-nCoV), the distribution of the intra-city express service.Its main products include: fresh vegetables, seasonal fruits, meat, poultry and eggs, wine and milk, grain and oil seasoning, leisure food, seafood and aquatic products, instant frozen food, personal beauty care, kitchen cleaning, home textiles, etc.But at the same time, the problems of logistics distribution terminal are more prominent. There are several main problems: the low degree of information system; the lack of standardized management, standardized distribution process, imperfect receiving mode of distribution terminal and high logistics cost.The main reasons are as follows: first, the information construction is not perfect, consumers can not trace the source of goods, lack of standard provisions for compensation for loss and damage, resulting in low efficiency and high logistics costs.The main reasons are as follows: first, the imperfect information construction leads to the failure of consumers to trace the source of goods, and the lack of standard provisions for compensation for loss and damage.All these bring about low efficiency and high logistics cost.Secondly, the industry management does not match the policies formulated by the state. Therefore, there are some market chaos, such as the distribution in the same

city is mostly small batch distribution, the distribution tools are motorcycle and battery car as the main distribution vehicles, retrograde, rush through red lights, occupy sidewalks and other problems.Third, most of the distribution is based on the collection of goods from nearby stores, and consumers have to pick up goods from the stores themselves. Moreover, the temporary storage of goods in the collection stores is not standardized, which may lead to the deterioration of goods.as shown in Table 2

Table 2: The main problems in the logistics distribution terminal.

Main species name	The problems
Fresh vegetables,seasonal fruits, meat, poultry and eggs，Alcohol and milk drinks, grain and oil seasoning, snack foods，Seafood and aquatic products, instant frozen products, personal care beauty，Kitchen and bathroom cleaning, home textiles	There are problems in system engineering management, logistics resource integration and standardization: 1. Mainly, the current level of credibility is low; 2. Infrastructure construction is not perfect; 3. The concept of coordinated competition is not popularized; 4. Lack of support from the government and related public organizations 5 , The core problem caused by the above problems: high logistics cost;

4. Construction of Intra-city Logistics System Based on Blockchain Technology

Coupling blockchain technology with intra-city logistics, covering customers, merchants, logistics systems, governments, and certification experts in the entire blockchain module.Customers can clearly understand the basic information of the product, dynamically detect logistics information, improve logistics efficiency, and reduce logistics costs at the same time. The design of the intra-city logistics system based on blockchain technology is shown in Figure 1.
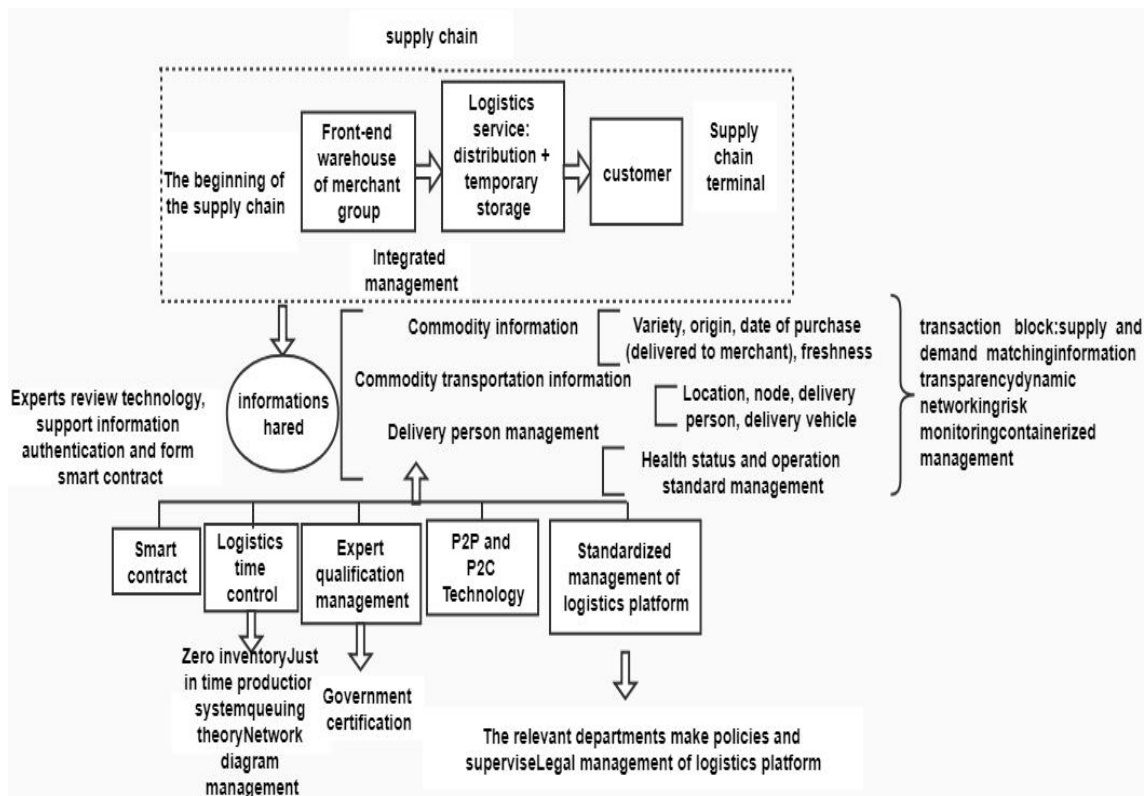

Figure 1: Design of intra-city logistics system based on blockchain technology.

4.1.　Main Body Composition of Intra-city Logistics System based on Blockchain Technology

The emergency logistics system under the blockchain is mainly composed of relevant government laws and regulations and regulatory departments, business groups, logistics service systems, expert certification organizations and customers of service terminals.The sub blocks of the block chain perform their respective duties and establish a transparent, authoritative and risk sharing coordination organization to serve the supply chain.

4.2.　Technical Composition of Intra-city Logistics System based on Blockchain Technology

The main three goals of the system are: to improve the degree of information sharing, to achieve authoritative authentication, to build a trust mechanism, and to reduce logistics costs.Therefore, the system involves basic intelligent software, and needs to use peer to peer(P2P), peer to consumer (P2C), artificial intelligence, milkrun operation technology, barcode, POS (point of sale) system, EDI (Electronic Data Interchange) technology, GPS and other intelligent technologies.Milkrun cycle picking up is that one (or several) transportation contractors pick up the goods from suppliers a, B and C in order according to the pre designed picking up route, and then directly transport them to the factory or parts redistribution center.Barcode is a group of bar and empty symbols arranged according to certain coding rules to represent specific information[12].Bar code system is an automatic recognition system composed of bar code symbol design, production and scanning reading[13].POS (point of sale) is that the dynamic data of sales should be transmitted to production, purchase and supply in time. POS machine automatically reads data through cash register to realize the sharing of real-time data in the whole supply chain. The efficiency of operation in the cashier can be greatly improved, and the customer satisfaction will be improved[14].EDI (Electronic Data Interchange) mainly lie in that, on the one hand, it replaces the previous paper document mailing and delivery by electronic transmission, so as to improve the transmission efficiency. On the other hand, it replaces manual data processing by computer processing, so as to reduce errors and delays[15].Integrate these technologies to support the operation of the whole logistics system, dynamically monitor logistics operations, and improve the efficiency of logistics inspection.

4.3.　Construction of Trust Mechanism of Intra City Logistics System based on Blockchain Technology

First of all, from the top-level building, the state should improve the logistics supervision mechanism in related aspects, and in the planning aspect, actively provide support for logistics nodes.Secondly, in the aspect of expert certification, it is necessary to realize the establishment of certificate assessment, especially the regular assessment of food experts, promote the risk sharing mechanism, and achieve the goal of quality assurance, authority certification and equal rights and responsibilities.Third, the third party logistics needs to supervise all the processes in the supply chain according to the laws and regulations, and improve the rules and regulations.

5.　Conclusions

Logistics management is an important part of the real economy and network economy, is the key to improve the core competitiveness of enterprises.City Distribution solves the problems that many young people live in big cities, work fast and lack spare time to buy daily necessities, and the hight cost of going out for consumers.In the process of integrating blockchain technology into local distribution, we should first clarify the main body of local logistics system based on blockchain technology, then strengthen the construction of information system, finally integrate blockchain

technology and improve the trust mechanism, so as to provide consumers with trustworthy services, improve the logistics efficiency of local distribution and consumer satisfaction.

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