Research on Campus Food Safety Traceability System Based on BT Technology

Yi Sheng *, Rui Shi, Jiandong Zhu, Dexiang Zhang

Department of Management Engineering, Qingdao Technological University, Qingdao, Shandong, 266520

* Corresponding Author Email: 767313943@qq.com

Abstract. This paper takes BT technology as a carrier and aims to establish a campus food traceability system, taking Qingdao University of Technology as an example to start the research and gradually expand to other universities. The BT technology is applied to the whole process of food sales, including the source of ingredients, food production, food sales, and food prosecution, and the information collected by the BT technology chain is put into the Campus Food Safety App, which not only provides detailed information on the whole process of food purchase from the purchase of ingredients to the purchase of campus personnel, but also provides a platform for students to report food on campus, solving the problem from the root, and making full use of the superiority of the Internet. The app not only provides a platform for students to report food on campus, but also solves the problem at the root, making full use of the superiority of the Internet to build a food traceability platform that reflects the true and high technology amount to ensure campus food safety, forming a complete feedback mechanism and becoming the last link of the campus food safety traceability system.

Keywords: BT technology, Campus food safety app, Data chain.

1. Introduction

At this stage, campus food safety supervision is not in place. Since school administrators and leaders attach less importance to campus food safety, the division of responsibility for food supervision is not clear, and the quality of purchased food cannot be guaranteed, resulting in greater safety risks; the overall quality of practitioners is not high. Currently, school cafeteria staff are generally older, with varying levels of quality and a weak awareness of food hygiene. Students' awareness of food safety is weak [1]. When they encounter food safety problems, most students do not defend their rights due to insufficient legal knowledge or because they are too much trouble, resulting in food safety problems not being solved effectively.

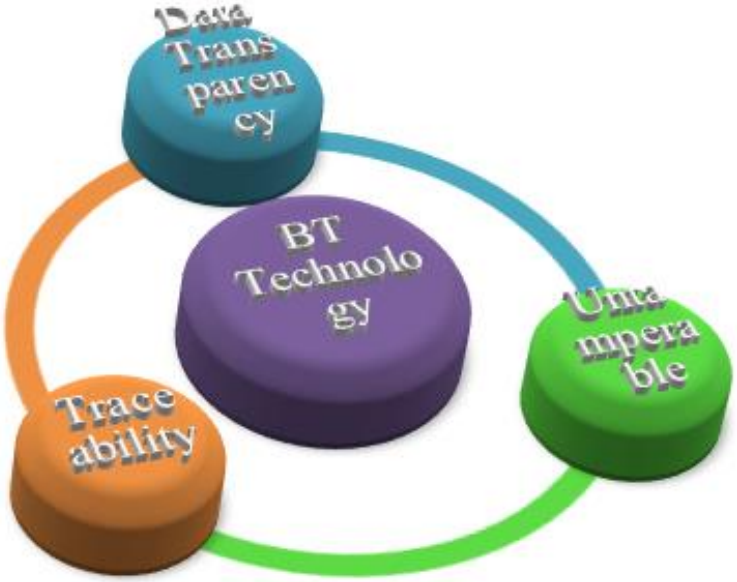

Figure 1. Superiority of BT Technology.

The country attaches great importance to the development of BT technology, and from October 2016 to May 2021, different national departments have issued several documents on accelerating the development of BT technology.BT has high-quality characteristics such as data transparency, not easily tampered with, and traceability (as shown in Figure 1 superiority of BT technology), and has been applied in the fields of healthcare, manufacturing, transportation, and agriculture, and many Fortune top 500 companies and government agencies are applying block chain technology[2]. The interconnection of BT technology and food traceability links not only develops a new way of food traceability, but also opens up new horizons for the development of BT technology [3].

BT technology, as an emerging technology, can already be applied in the food industry traceability system to provide a better solution, and the difference with the existing technology is also great. The solution of IoT + big data technology is more cumbersome and has higher time cost. The block chain technology added on top of it will make food safety traceability more convenient and efficient, and to a certain extent can quickly solve the regulatory problems of China's food safety traceability system and help food safety development. This project takes strong measures to build a foundation, make up for shortcomings and raise the level, to strictly prevent and control school food safety risks, to curb the occurrence of major food safety accidents in groups, and to continuously improve the sense of access, happiness and security of teachers, students and parents with regard to school food safety. Through this technology, school cafeterias will be able to provide the public with real data on food practices and sources, so that students can make better choices and thus supervise the use of better food ingredients to improve the taste and quality of meals, and play a role in urging school cafeterias to improve the quality of their meals [4].

We believe it is necessary to build a food safety traceability system in colleges and universities so that basic food information can be easily displayed to students. This will allow students to learn about the source, transportation, and processing of food, and increase their trust and satisfaction with school food. If students find problems in their daily diet, they can report the problems to the reporting center through the campus food safety app, and set up a special processing team to solve the problems, which can not only solve students' diet problems in a timely manner, but also urge the cafeteria to improve food quality.

2. Analysis of The Current State of Research

2.1. Domestic research status and development dynamics-aerospace food safety

The application of block chain technology in the field of spaceflight food is expanding. The application of block chain technology in spaceflight food can effectively guarantee spaceflight food safety while saving resources, and realize spaceflight food quality and safety warning. In long-term manned space missions, the health and safety of astronauts is the primary consideration. China's aerospace food safety control system is a series of standards that integrate GJB9001, ISO standards and critical control points for hazard analysis, and improve the safety control system according to the current situation of aerospace food in China [5]. Block chain technology is one of the effective technical means to solve food safety problems. Take fresh fruits and vegetables as an example, China has successfully realized the engineering application of fresh apples in the SZ-12 mission, and more varieties of fruits will be transported into space in the future. Before entering space, fresh fruits and vegetables need to go through strict screening tests and experimental verification of morphology, texture, flavor, storage resistance and breakage rate, among which the source control from the orchard is the basis for achieving product quality and safety [6]. In the future, the blockchain and IoT fusion framework built based on the scalable federated chain can further realize the integration of product information of origin and quality and safety traceability, thus realizing the digital construction of agricultural products such as fruits and vegetables in China. Under the background that all aspects of aerospace food from production to storage and transportation are under socialized guarantee, it is necessary to enhance the supervision intensity of strengthening food enterprises in processing, logistics and transportation, etc. Therefore, it is necessary for aerospace food processing enterprises

to realize the safety traceability of food processing raw materials, the wisdom construction of production workshops and the construction of word-oriented logistics platform through block chain technology, which is important for improving the stability of aerospace food and guaranteeing This is of great significance to improve the stability of spaceflight food and ensure the safety of spaceflight food.

2.2. Foreign research status and development - cooperation between U.S. Food Company and Blockchain Company

Neogen, a U.S. food safety company, has partnered with food block chain company ripe.io to improve the transparency of its products, ensure food safety and enhance brand value. neogen is using block chain technology to provide genomics services for DNA testing of livestock and poultry products to meet breeders' needs for sustainable, traceable and high-quality meat. Neogen's chief executive officer said block chain has great potential to test the authenticity of high-quality products and improve traceability of issues that cause product defects. Poultry companies use IBM's Food Trust food safety block chain solution to improve the traceability of their products. For example, AvrilCroup, owner of the French fresh egg and fat brands Matines and Lesieur, recently announced its addition to IM's Food Trust block chain platform to enhance the traceability of its MatinesEggs product line [7].

3. BT Technology Bearer End - Construction and Application of Campus Food Safety App

The project focuses on collecting a large amount of data on the food production process and presenting the data in the form of an app, studying the BT technology end of campus ingredients purchase, campus cafeteria elimination records and food ingredients, and drawing up the detailed interface of the BT technology bearing end-campus food safety app to promote the closed-loop cycle of campus food safety traceability system.

3.1. BT technology starter - campus food purchase data chain

At the beginning of the establishment of the app, special equipment was installed at the premises where the school purchased the ingredients to ensure the accuracy and error-free entry of the data and the integrity and immutability of the information received by the users. The equipment contains three major parts: a server, a storage system and a fiber optic switch. The server and the fiber optic switch and the fiber optic switch and the controller are converted in both directions. The HBA and the network card in the server can enter the relevant data, and after being converted into a computer language readable by the memory after passing through the fiber optic switch, the controller of the storage system ensures the immutability, traceability and data transparency of the entered data, and finally after the SAS-HBA statistical analysis and finally into the JBOD for storage. At the same time, the data stored in JBOD can also be transferred back to the namenode data management server through the controller and fiber optic switch, thus realizing the process of data inter-reversibility [8].

After all the data is pre-processed in the fiber optic switch, the data flows from the fiber optic switch to the server, and then the name node data management server is connected to the Campus Food Safety app, and the Campus Food Safety app is also connected to other datanode servers. At the same time, the "Campus Food Safety" app is also connected to other datanode servers, which is the feedback side of users. "The name node server can also collect the feedback from the users through the "Campus Food Safety" app, and the data presentation principle is shown in Figure 2.

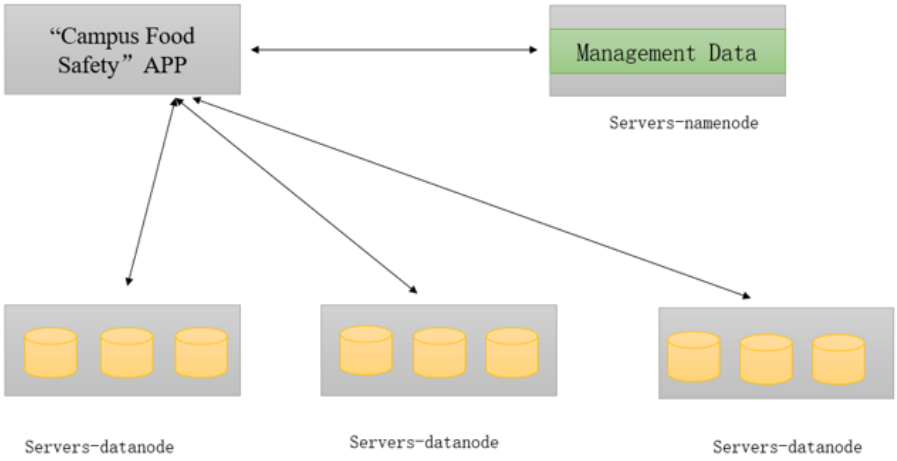

Figure 2. Schematic diagram of data presentation principle.

Such as the source of ingredients on campus, the storage time of ingredients. Overview of where the ingredients are purchased and how long the food is stored for each type of food is shown in Table1.

Table 1. Overview of where the ingredients are purchased and how long the food is stored for each type of food.

Food Name	**Food materials and place of purchase**			**Food storage time**		
Chicken in fish sauce	Chicken	Bok Choy	Broad noodles, enoki mushrooms and other ingredients	Chicken	Bok Choy	Broad noodles, enoki mushrooms and other ingredients
	Linyi Fresh Market	Nearby Farmers	Wholesale Farmers Market	1 day	2 days	2 days
Duck Leg Rice	Duck meat	Small oilseed rape	Rice	Duck meat	Small oilseed rape	Rice
	Linyi Fresh Market	Wholesale Farmers Market	Grain Complex Market	1 day	2 days	1 day
Spicy Hot Pot	Vegetables	Meatballs	Fans	Vegetables	Meatballs	Fans
	Nearby Farmers	Hot pot material wholesale market	Wholesale Farmers Market	1day	2 days	4 days
Braised Pork Ribs	Spare Ribs		Winter Melon	Spare Ribs		Winter Melon
	Linyi Fresh Market		Wholesale Farmers Market	1 day		3 days

3.2. BT technical key end - cafeteria extermination and dosing records

At this stage, we also set up data entry equipment in the cafeteria, using the BT data chain to transfer the collected information on the disinfection records of the cafeteria, the auxiliary materials, condiments and production tools to the "Campus Food Safety" app in detail, presenting the whole process of food production in 360° without any dead angle in front of the public, and truly using BT technology to create a food traceability system for the benefit of the public (the technology used in this part is still BT technology, and the specific BT technology principle is the same as above).

3.3. BT technology data carrying end - "Campus Food Safety App"

The app uses the most advanced BT technology to present all the information in the BT technology chain on the app, which sets up the inquiry window on the food purchase side and the food production process side, thus ensuring the safety of food and the visualization and transparency of the food processing process. In addition, the home page of the app also has a shortcut to the website of the national food supervision to ensure that users can view the latest food information, and the home page also shows the number of food safety incidents that occurred in the school in a year when the user finishes locating the campus [9].

3.3.1 Campus Food Safety app Interface for reporting food violations on campus

In order to allow users to monitor and report cases of school food violations more quickly, a campus food violation reporting section is designed, which includes a report mailbox, contact school, customer service answers, and the results and and quantity of the school's handling of the reported incident, so that users can better and more clearly understand the school's thoughts on solving the reported problem. In the report mailbox, users can send feedback on food regulations on campus to the school's logistics management department, municipal food quality inspection department and other relevant departments; at the same time, in the contact school window, you can directly check the phone number of the school's logistics management department, the school's branch cafeteria safety officer, the principal and other relevant leaders, and directly connect to the call hotline; in addition, you can also fill out the report content window to the questionnaire In addition, you can also fill in the report content window, in the form of a questionnaire to feedback to the app backend head office, the relevant responsible personnel to deal with food safety incidents. If the user cannot confirm whether there is a real food safety problem, he can ask directly through the customer service window in the interface, which will give him data about the food he is asking about and give specific answers [10].

3.3.2 Campus Food Safety app Campus Locator Interface

The app has a campus binding section, after opening the location into the app can accurately locate their location location, our app includes all the schools and sub-campuses in China, more convenient for users to locate and binding, can be used in all colleges and universities in the country to promote.

Every user can register and log in with their cell phone number, and there is no restriction on the scope of use or the group of users. Students and teachers at school can log in to the app to check detailed food data information and eat with peace of mind; at the same time, parents of students can also use the app to locate their children's school and check the food-related information of that school through it, giving parents a peace of mind. Although the app is based on the background of each university, it can also be promoted in major supermarkets, shopping malls and hotels.

4. Conclusion

In this paper, BT equipment that can be used for data entry is set up at the food ingredient purchase and campus cafeteria, and the equipment contains three major parts: servers, storage systems and fiber optic switches. At the foodstuff purchase end, the BT technology chain collects a large amount of information about where the foodstuffs are purchased, how long the foodstuffs are stored and other relevant information about the foodstuff purchase end, fully investigating a large amount of data and

building a key beginning of a system for good food safety traceability. At the canteen extermination record end, the BT technology chain carries a large amount of detailed information about food raw materials, auxiliary materials, production utensils and their extermination time records, locking the key links and ensuring that each step is safe and true. On the BT technology carrier side, we set up a "Campus Food Safety" app, which integrates the specific data collected by the BT chain on the purchase of ingredients and canteen disinfection into the software, so that students and teachers can intuitively check all the records of the food they buy. The app also includes a window for reporting food violations on campus, allowing students and teachers to respond to the school about food safety issues in the cafeteria, forming a closed loop.

References

[1] Gao Feng, Yu L, Lu Shangqiong, Xu Qingxiang & Yu Lijie. (2009). the current situation and development trend of foreign facility agriculture. Journal of Zhejiang Forestry College (02), 279-285.

[2] Zhang Y, Mu N & Zhang Xueqing. (2008). the development status and trends of foreign facility agriculture. Agriculture and Technology (02), 123-125.

[3] Ding Zhenxing. (2021). Block chain-based food security traceability system design. Information Systems Engineering (06), 7-10.

[4] Lin, Wenhao. (2021). Design and implementation of a block chain-based integrated information management system for smart grain silos (Master's thesis, Anhui University).

[5] Wang, Lin. (2020). Research on the construction of a block chain-based grain emergency case base. Journal of Intelligence (12), 157-163.

[6] Wang Yao. (2020). Exploration on the application of grain quality monitoring system based on Internet of Things and block chain technology. Information Technology and Informatization (09), 128-130.

[7] Tan Yanwen, Li Congxi & Song Qing. Application of blockchain technology in agricultural supply chain - theoretical mechanism, development practice and policy implications. Issues in Agricultural Economics.

[8] Lu, Lina, Yin, Lihong, Yu, Xiao, Yin, Jufeng & Shang, Shijie. Research on building a blockchain-based model for agricultural science data management scenarios. Intelligence Science.

[9] Zhang, Mengqi. (2022). Research on Agricultural Products Supply Chain Traceability System with Blockchain Technology. Rural. Agriculture. Farmer (B) (05), 20-21.

[10] Wu, J.L., Su, M.Y., Deng, et al. Application concept of blockchain technology in ecological restoration of homeland space. China Land and Resources Economy.