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A Survey on Fake Product Identification System

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***Abstract*—Risk factors like forging and duplication frequently accompany the global enhancement of a product or innovation. The reputation of the company and the well-being of the customer can both be affected by forging. Nowadays, finding fake items is the biggest test. It is necessary to have a system for end user to check all details about product that they are buying so that the customer can check if the product is genuine or not. False goods have a serious negative effect on the organization and the clients' welfare. As a result, product makers are facing severe hardship. India and other countries are fighting against such phoney and counterfeit goods.**

Blockchains can be used to find genuine items and detect counterfeit products. Blockchain technology is a distributed, decentralised, and digital ledger that maintains transactional information in the form of blocks in a network of database/nodes. Blockchain technology is safe because the data saved once in the chain is immutable, which means that no block can be modified or hacked. Customers or users do not need to rely on third-party users for certification of product authenticity and safety.

In our project, the system generates QR (Quick Response) codes by employing Blockchain technology. Blocks are used to hold exchange records in this innovation. Data stored in these squares cannot easily be accessed or changed. A counterfeit product can be identified using a QR code scanner, in which a product's QR code is linked to Blockchain. As a result, this system can be used to store product details and created unique codes for that product as database blocks. It captures the user's unique code and compares it with records in the Blockchain database. If the code matches, it means the product is real and genuine and we can display all the information related to the product; otherwise, product is fake or bogus which will be notified to the end user.

***Keywords*—Blockchain, Bogus, Counterfeit, blocks, QR code, genuine.**

I. INTRODUCTION

The worldwide development of a product or technology is always fraught with risk factors such as counterfeiting and duplication, which can harm the company's reputation, revenue, and consumer health. In the supply chain, there are several items to identify if a product is genuine or counterfeit. Manufacturers are experiencing a major challenge and massive losses as a result of counterfeit or fraudulent items. Blockchain technology can be used to verify the authenticity of a product. Our project's primary concept is to determine if the goods purchased by the consumer is genuine or counterfeit. We have traditional supply chain in comparison to blockchain. Traditional supply chains provide a centralised network in which the data is in the hands of the firm that delivers the service or product in the market, and they own the data, which they may change as they choose, making them insecure. Counterfeit items are created to capitalise on the better value of the mimicked products. As previously stated, traditional supply chains use a centralised network, but Blockchain uses a decentralised data base, with each transaction including the data value for the goods[9].

Because blockchain is a peer-to-peer network, this is accomplished by establishing a record whose legitimacy can be checked by the whole community. As a result, manufacturers may utilise this method to supply authentic items to customers. This will help to sustain client trust and boost the market worth of the product's brand. Every block in blockchain consists of data, hash, and preceding block hash. Data is the relevant information, while hash is the unique code. It is difficult to modify any block's data since the person changing the data must possess the majority of the network. If we attempt to update the data of any block, the hash will be modified. As a result, blockchain has a significant benefit over traditional centralised architecture in that the data in blockchain is irreversible, ensuring that the buyer who purchases the goods receives accurate product information[9].

The system has four essential components: a transaction record, the owner of the goods, public access to the information, and the ability to modify the data. As products' data is changed in the network, a hash for the product is produced, allowing the product's transactional information and current ownership to be tracked. As items move from producer to distributor, then distributor to client, blocks are formed. The QR code is added to the merchandise when it is produced from the hash address. When a consumer scans the QR code, he receives information related to the product and they are informed if the goods is genuine or counterfeit. Figure 1 illustrates characteristics of a block in Blockchain system[10].

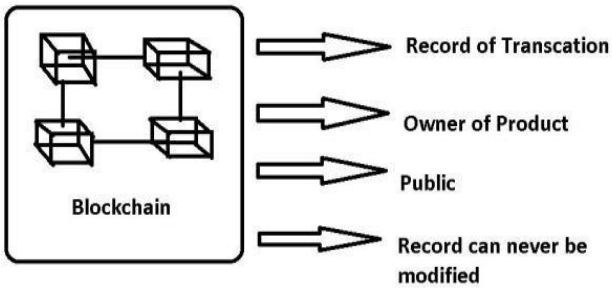

Fig. 1: Block in blockchain

II. MOTIVATION

There The dissemination of counterfeit goods has expanded globally in recent years. The existing supply chain contains a large number of counterfeit goods. The survey claims that occurrences of bogus products have

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increased recently. It is essential to have a system in place that allows buyers or users to verify all the product's specifications so they can determine whether the item is authentic or not. There is currently no system in place in India to identify fake goods. Therefore, the solution entails a straightforward QR code-based identification that can assist the end-user or customers in scanning and verifying the product's authenticity using a smartphone[3].

Anticounterfeiting of products is critical in Supply Chain management. Organizations that wish to thrive in the E-commerce sector should give consumers with product information as well as a platform to inquire about the goods. The consumer must trust the whole system structure and comprehend how the product is delivered to the client at the end of the cycle. All of this must be made available to customers via a website. Few enterprises, both small and medium-sized, may be devastated, whilst huge Organizations will be financially secure. Traditional techniques of preventing counterfeiting have failed and may be continue to fail because customers lack trust in the system. Product counterfeiting may be totally eliminated by paying low transaction costs and trusting the system. Customers and businesses are concerned about man-in-the-middle attacks. Even with the introduction of RFID and other mobile technologies, counterfeiting could not be stopped. Encrypted QR code approaches will have to be created to prevent various attacks and product counterfeiting. This can only be accessible by authorised individuals, who will be governed by the supply chain network's permissions. Secure system operating will result in successful Blockchain system administration in any firm[10].

III. OBJECTIVE

- This project's concept originated as a result of the rise in counterfeit goods.
- The project's goals are to develop a anti-counterfeit system.
- To use a QR code to safeguard product information. By making data available to clients, you may give them security.
- Manufacturers can use the system to store information of products will sale and buying in Blockchain which is accessible to everyone.

IV. LITERATURE REVIEW

This paper [1] includes Survey on Counterfeit Product Detection. Customers often seek out counterfeit goods for a variety of reasons, such as a lower price or as a substitute for the original, with the internet marketplace quickly becoming the major platform for purchasing counterfeit goods. The volume of counterfeit items on the internet and on the black market is expanding at an exponential rate. As a result, there is an urgent need to solve the issues of identifying counterfeit items and develop appropriate technologies to increase detection accuracy. This is one of the current research areas being investigated. This study addresses numerous strategies for detecting counterfeit items which includes QR code-based Product Authentication, Watermarking algorithm, RFID method for detecting counterfeit products, Holographic barcodes using computer generated holograms, etc. This different methods are analysed and compared using technology based data analytics which includes Real-time analytics, Predictive analytics, Security analytics and trust analytics [1].

In this paper [2] authors have created a Blockchain-based Supply Chain Quality Management Framework. It describes how the standard cloud storage approach is centralised, therefore a single point of failure might cause the system to crash. The system combines the IPFS decentralised storage system, the Ethereum blockchain, and attribute-based encryption technologies. The decentralised system, which is based on the Ethereum blockchain, offers a keyword search function on the encrypted text, which solves the problem with traditional storage systems where cloud servers provide incorrect results. They proposed a blockchain-based system in this study. Based on blockchain technology, this framework will provide a theoretical foundation for intelligent supply chain quality monitoring. It also serves as a foundation for the development of theories regarding information resource management in distributed, virtual enterprises [2].

In this paper, they have created a QR code based fake product identification system using blockchain technology. They have used Android studio and Firebase cloud in the system implementation. SHA-256 algorithm is used to generate hash. SHA-256 is a patented cryptographic hash function that outputs a value that is 256 bits long. The proposed system consists of three main parts :- customer or user android application, Manufacturer's or company's android application, and Database. Manufacturer add product details into the database and generates a unique QR code for each product. All the product related information such as manufacturers' details, product id, manufacture date, price, etc. is stored in blocks. Once a product order is saved on the network, a hash code for that product is generated, and the product transaction may be maintained. A QR code is produced for each product in the proposed system. Customers scan the QR code on the goods or packaging with their smartphone's QR code reader application, or they can use a customer application that includes a QR code scanner. After scanning, we can decide if the goods is genuine or counterfeit. Finally, the Blockchain system stores these product characteristics along with history of transactions, with the help of it we can track the product along the distribution chain. The firebase cloud database stores all of the product details, hash value and block name [3].

This study [4] is based on Smart Tags for Brand Protection and Anti-Counterfeiting in the Wine Industry. This article proposes a trademark protection and anti-counterfeiting solution for the wine sector based on smart tags and Cloud enabled technology. The fundamental idea behind smart tags is to use rapid response codes and functional inks backed by the Cloud system, as well as two-way communication between the winemaker and end-user [4].

The authors of the research explain the notion of Blockchain technology in food supply chain information security and compare it to the old supply chain

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system. The suggested method focuses on the drawbacks, encouraging blockchain for tracking, monitoring, and auditing the food supply chain and assisting producers in recording transactions in authenticity. They just provided a theoretical notion, not an actual implementation of the suggested system [5].

The paper's author explains how blockchain works in the food supply chain using HACCP. The system presented a new decentralised traceability system based on the internet of things and blockchain technology, as well as investigated the issues associated with scaling block-chains in general. This technology will provide real-time information on the safety status of food goods to all supply chain members. Furthermore, the system has the potential to considerably increase the efficiency and openness of the food supply chain, which would certainly improve food safety and restore public confidence in the food business. The other papers are cited and can help with the implementation of the suggested system in a variety of ways [6].

This article aids in the monitoring of drugs from the industry to the user or patient. The Hyperledger fabric is mostly utilised to implement the complete concept. In this arrangement, the maker must upload a drug's information to a website, which is then forwarded to the government for approval. After the government has authorised the pharmaceuticals, pharmacists may use blockchain technology to request them. Furthermore, if a patient requires medication or drugs, a request is sent to the blockchain network. The request will then be approved or rejected by a medical authority or doctor. Because the whole model is built on a blockchain network, we can prevent drug counterfeiting and monitor the transit of pharmaceuticals from the maker to the patient. This article primarily informs us about Hyperledger, which may be integrated in our suggested system, as well as the specifics of many genres to approve the product in this field [7].

In this paper they have used blockchain technology and Python to generate QR codes. They then utilised this technology to establish a app or website where users may manage their inventories. They are utilising blockchain and QR code technologies to develop a dependable and transparent inventory management system. They may utilise Python to design QR codes that are customized to certain items. The information about the sold items is subsequently distributed over the P2P network. A manufacturer can efficiently compute inventory by getting product characteristics from the blockchain database-EVM is a Python-based implementation of the Ethereum protocol. It offers low-level primitives for the current Ethereum 1.0 chain as well as compatibility for the forthcoming Ethereum 2.0 protocol. They built the Ethereum blockchain with Py-EVM to store data about sold-out items. They are leveraging Ethereum blockchain technology and Python to produce QR codes, which can be improved by applying an algorithm in blockchain technology. They utilised this technology for inventory management here, and we used this information and improved it by developing a website and used it for the goal of identifying a bogus product [8].

Effective supply chain management is a problem in any industry, but there is added complexity and risk in healthcare because a disrupted supply chain can directly affect patient safety and health outcomes. Blockchain technology is one potential solution for improving the security, integrity, data provenance, and usefulness of the health supply chain. This paper [11] gives an overview of the opportunities and problems connected with blockchain adoption and deployment in the health supply chain, with a focus on pharmaceutical supply, medical equipment and supplies, the Internet of Healthy Things (IoHT), and public health. The infiltration of the combined category of substandard and falsified (SF) medicines, sometimes known as counterfeit medicines but often with a different legal meaning, is a severe and well-known threat to the pharmaceutical supply chain. These various forms of compromised and fake medicines can manifest as a result of importing substandard drugs without local approval, poor manufacturing practises or improper storage, drug theft and diversion, and the infiltration of poor quality or fake products into grey markets (business conducted outside of legal channels). Several organisations are currently investigating the application of blockchain for pharmaceutical supply chain management by building use cases, simulation models, and blockchain prototypes. The Centre for Supply Chain Studies is driving the conceptual process behind this development[11].

Food safety has emerged as a major issue in China in recent years. Because traditional agri-food logistics patterns can no longer meet market needs, developing an agri-food supply chain traceability system is becoming increasingly important. In this paper, we first examine the utilisation and development situation of RFID (Radio-Frequency IDentification) and blockchain technology, and then we analyse the benefits and drawbacks of using RFID and blockchain technology in the construction of an agri-food supply chain traceability system; finally, we demonstrate the system's construction process. It may achieve traceability with trustworthy information along the whole agri-food supply chain, successfully ensuring food safety, by gathering, transferring, and sharing authentic agri-food data in production, processing, distribution and warehousing. This paper [12] establishes an agri-food supply chain traceability system based on RFlD and blockchain technologies. This system encompasses the entire process of data collection and information management for all links in the agri-food supply chain, enabling monitoring, tracing, and traceability management for agri-food quality and safety "from farm to fork." In future research, with the rapid development of blockchain, the logistics industry's development trend will be to construct a decentralised system in which the information can be entirely trusted. Furthermore, RFTD technology will be more frequently used in the logistics business if application costs can be greatly decreased [12].

V. PROPOSED SYSTEM

There was no adequate solution previously to distinguish counterfeit products from authentic products. Blockchain technology may be useful in

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addressing such issues. The major purpose of this project is to assist individuals in determining if a product is genuine or counterfeit. For the detection of counterfeit products, we propose a false product detection system based on blockchain technology which can be an Android application or a website. The proposed approach ensures the detection of counterfeit products in everyday life. The suggested system is divided into three major entities: the customer or end user, manufacturer, and the blockchain/database[3].

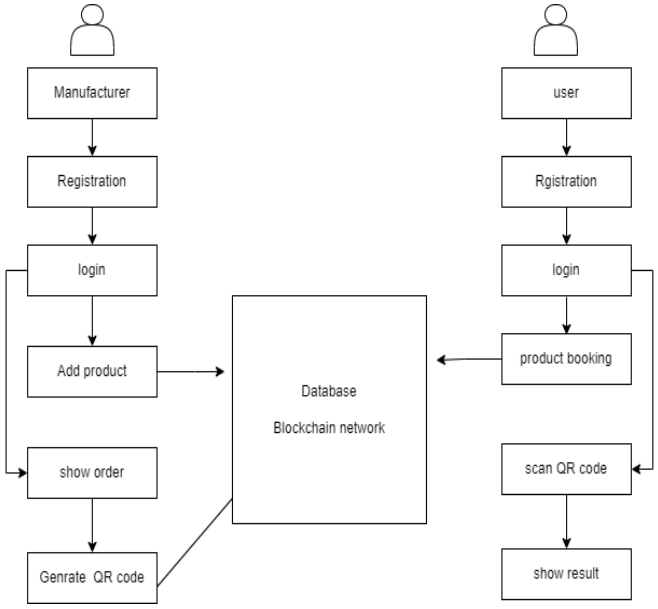

Fig. 2: Workflow of proposed system

The Manufacturers or corporate side application is the initial part of the website where they have to register. After logging onto the website and completing the registration procedure, we have a few options. One is to add a product and allow the creator fill in the details. Another option is to display the order so that they may see the details of the clients' orders. The manufacturer can also see whether or not the goods have been delivered. We can scan QR code using any scanner application or may create a option to upload QR code on this website and assess if it is fraudulent or legitimate. The customer logs in and fills out the essential information to order and book the product in our proposed system. The order of the product may be shown to the producer. When an order for a product is approved, the manufacturer generates the product's unique QR code. When a product order is saved on the network, a hash code is generated for that product, making it easier to track the transaction. In the suggested system, a QR code is generated for each product. Customers can scan the QR code on the goods or packaging with their smartphone's QR code reader application or a QR code scanner on the customer's website[3].

We can tell if the goods are genuine after scanning it. Finally, the Blockchain system records these product details as well as a transaction history, enabling for product tracking along the supply chain. The database stores all product details, hash values and block names etc. The hash function used is the SHA-256 algorithm. The Secure Hashing Method SHA 256 is the Bitcoin protocol's hash function and mining algorithm, referring to a cryptographic hash function that generates a 256-bit value. The establishment and management of addresses is supervised, and transactions are also validated. It's also used for password verification because it avoids the need to maintain precise passwords because the hash values may be saved and matched to the user entry to verify if it's accurate [10].

Using Blockchain technology to prevent product counterfeiting could benefit both e-commerce enterprises and customers. The manufacturer, distributor, and customer will all have access to the product's information from the time it is made until it reaches the client, and it is nearly hard for a third party or a hacker to change the details of the product between any of the blockchain linkages. The blockchain technology is governed by smart contract codes. A QR code generated for a product is validated as the goods is delivered to the customer and the QR code is matched. Because of the simplicity of the coding, the consumer can have faith in this Blockchain-based application. The code could be simplified in the future. Customers will be unaware of Blockchain-based E-Commerce websites, thus in order to persuade them to purchase a product from this website, they must understand how this website differs from other shopping websites and the benefits that this website offers. It will be difficult to promote this website.

VI. CONCLUSION

With the large volume of counterfeit products available online, the counterfeiting industry is increasing at an exponential rate. As a result, there is a great demand to detect counterfeit products, and blockchain technology is utilised to detect counterfeit products. Furthermore, the data is encoded into a QR code. Customers or users can detect bogus products after scanning the QR code. In blockchain technology, digital product information can be kept in the form of blocks.

In this paper, we have surveyed some papers and projects related to our topic and studied how they have implemented their systems. By using this information, we are going to develop our system to identify fake products. We have also discussed solutions to fight against malpractices of forging of the products. As a result, the suggested method can assist customers in detecting bogus products in the supply chain. Users can scan QR codes attached to products to obtain information such as transaction history and current owner, allowing the end-user to determine if the goods are genuine or not.

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Vol. 12 Issue 01, January-2023

VIII. REFERENCES

[1] B.Prabhu Shankar, Dr.R.Jayavadivel, "A Survey Of Counterfeit Product Detection", INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH VOLUME 8, ISSUE 12, DECEMBER 2019.

[2] Si Chen, Rui Shi, Ren, Jiaqi Yan, Yani Shi, "A Blockchain-based Supply Chain Quality Management Framework", 14th, IEEE International Conference on e-Business Engineering, 2017.

[3] Tejaswini Tambe, Sonali Chitalkar, Manali Khurud, Madhavi Varpe, S. Y. Raut," Fake Product Detection Using Blockchain Technology", International Journal of Advance Research and Innovation ideas in Education(IJARIIE), 2021.

[4] Steven Sandi, Sanja Radonjic, Jovana Drobnjak, Marko Simeunovic, Biljana Stamatovic and Tomo Popovic "Smart Tags for Brand Protection and Anti-counterfeiting in wine Industry" 23rd International Scientific-Professional Conference on Information Technology (IT), 2018.

[5] Daniel Tse, Bowen Zhang, Yuchen Yang, Chenli Cheng, Haoran Mu, "Blockchain Application in Food. Supply Information Security", 2017 IEEE International Conference on Industrial Engineering and Engineering Management (IEEM).

[6] Feng Tian, "A supply chain traceability system for food safety based on HACCP, blockchain &Internet of things", 2017 International Conference on Service Systems and Service Management.

[7] Abhinav Sanghi, Aayush, Ashutosh Katakwar, Anshul Arora, Aditya Kaushik, "Detecting Fake Drugs using Blockchain", International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878, Volume-10 Issue1, May 2021.

[8] G. Vidhya Lakshmi, Subbarao Gogulamudi, Bodapati Nagaeswari, Shaik Reehana, "Blockchain Based Inventory Management by QR Code Using Open CV", International Conference on Computer Communication and Informatics (ICCCI -2021) Coimbatore, INDIA, Jan. 27 – 29, 2021.

[9] Swaroop Jambhulkar, Harsh Bhoyar, Shantanu Dhore, Arpita Bidkar, Prema Desai, " Blockchain based Fake Product Identification System", International Research Journal of Modernization in Engineering Technology and Science, 2022.

[10] Srikrishna Shastri, Vishal, Sushmitha, Lahari, Ashwal R Shetty, " ISSN (O) 2278-1021, ISSN (P) 2319-5940 Fake Product Detection Using Blockchain Technology", International Journal of Advanced Research in Computer and Communication Engineering, 2022.

[11] K. A. Clauson, E. A. Breeden, C. Davidson, and T. K. Mackey, "Leveraging Blockchain Technology to Enhance Supply Chain Management in Healthcare:: An exploration of challenges and opportunities in the health supply chain"' BHTY, vol. 1, Mar, 2018.

[12] Feng Tian, "An agri-food supply chain traceability system for China based on RFID & blockchain technology," *2016 13th International Conference on Service Systems and Service Management (ICSSSM)*, 2016, pp. 1-6, doi: 10.1109/ICSSSM.2016.7538424.