



Traceability of Counterfeit Medicine Supply Chain Through Block Chain

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Abstract – The main problems with drug safety in the counterfeit medicine supply chain, are to do with how the drugs are initially manufactured. The traceability of right and active pharmaceutical ingredients during actual manufacture is a tough process, so detecting drugs that do not contain the intended active ingredients can ultimately lead to end consumer patient harm or even death. Block chain's advanced features make it capable of providing a basis for complete traceability of drugs, from manufacturer to end consumer, and the ability to identify counterfeit-drug. This project aims to address the issue of drug safety using Block chain and encrypted QR (quick response) code security.

Keywords- Drug safety, QR code encryption and decryption, Data storage

I. INTRODUCTION

Pharmaceutical Research & Development is a difficult process that takes several years from drug discovery to drug development and regulatory approval. When all the process is done and a standard product is developed, the next challenge for manufacturers is to deliver the product to the right customer in its original form and to ensure that the customer get the genuine product that is developed by the legitimate manufacturer, not by counterfeiter. But the current Supply Chain Management system of pharmaceutical industry is outdated, and does not provide visibility and control for manufacturers and regulatory authority over drugs distribution and it cannot withstand the 21st century cyber security threats. This situation of Supply Chain Management leads to the production, distribution, and consumption of counterfeit drugs. Counterfeit drugs have created a particularly dangerous public health risk and increasingly been worldwide issue especially in developing countries. These counterfeit drugs directly and indirectly adversely affect health. Indirectly, these drugs do not contain the dosage or active agent required to kill the disease, that finally cause drug-resistant strains, and then even using the original drugs are useless. More directly, such counterfeits may contain active ingredients, but the amount is too low or too high, or produced in an impure manner that contains toxic ingredients, in this case it can cause very serious health problems. Counterfeit drugs manufacturers sometimes uses the brand logo of legitimate manufacturers and make fake products used in daily life, that is less harmful. But in many cases, they affect the drugs for the treatment of cancer, painkillers, cardiovascular disorders, antibiotics, contraceptives and other prescription drugs that can lead to very serious results.



Fig: Counterfeit medicine

According to the International Anti-Counterfeiting Coalition (IACC) counterfeiting has become one of world's largest and fast-growing criminal businesses, with an estimated value of more than US\$ 600 billion annually. For the prevention of counterfeit drugs, pharmaceutical industry needs an efficient supply chain management system, and the



best available solution to develop a perfect SCM system is the Block-chain technology. Block chain is a distribute ledger system (firstly introduced by a pseudonym Satoshi Nakamoto in 2008) that has shown widespread adaptability in recent years and a variety of market sectors sought ways of incorporating its abilities into their operations. Although, so far most of the focus has been on the financial services industry, but now projects in other service-related areas, such as healthcare, energy and legal firms also started using this marvel. Supply chain security is one aspect that has recently won attention. Any product subject to a sensitive production process and widespread reputational issues are associated with the final product, the benefits of Block-chain are evident. Block-chain is the best fit in those scenarios where privacy protection and data security are the highest priority. Therefore, pharmaceutical supply chain presents a further use case of Block-chain technology.

II OBJECTIVE:

- To allow participant access details of drugs, then public key must be shared by that participant to the manufacturer. Manufacturer will encrypt the QR code and will send back to the participant.
- To decrypt QR code by the valid participant by their private key..
- To deny illegitimate user access the block chain, only legitimate can access the block chain using public key.

III LITERATURE SURVEY:

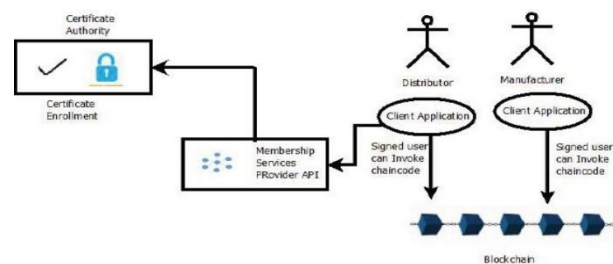
1. In the year 2018 Li, Yang, Marier- Bienvenue The scientific literature on blockchain technology is emerging but increasing rapidly. This review paper aims to provide a deeper understanding of the nature and scope of the extant literature on blockchain technology in the particular context of business organizations. To achieve our main objective, we searched five databases and screened 320 papers for inclusion. As a result of the search and screen process, we identified 39 relevant articles. Data coding was first pilot tested and then performed independently by two teams of researchers. All disagreements were reconciled by a third coder. Our findings reveal that most of the extant literature focuses on "how" blockchain technology works and, to a lesser extent, on the "what", i.e. its potential applications and usages in business organizations. For its part, the "why" question, which focuses on the organizational motivations for adopting blockchain technology, was scarcely discussed in prior literature. In short, our findings reveal that many issues and questions remain to be investigated. Based on a gap analysis, we propose a few promising avenues that shall guide future research efforts in this important topic.
2. In the year 2012, Raihan Ur Rasool; M. Sohaib Ayub proposed The sale of counterfeit medicine is a continuously growing global problem costing billions of dollars and effecting hundreds of thousands of precious human lives annually. Consumers of medicine have no reliable and simple way of distinguishing genuine medicine from counterfeit. In this paper we analyzed existing techniques of counterfeit medicine identification on the bases of usability, security and scalability. Different shortcomings and security weaknesses of these reviewed solutions are identified. Based on these observations, a set of requirements is determined. These requirements address different aspects of a complete solution, such as usability by end users, security of the system against various types of attacks and scalability of the solution. We then propose a framework for reliably ensuring the fidelity of purchased medicine.
3. In the year 2011 H.H.Cheung, S.H.Choi proposed RFID has emerged as a potential tool to combat product counterfeiting, which undermines the global economy hugely. Recently, a number of anti-counterfeiting approaches have been proposed for such purpose. This paper presents a track-and-trace system for RFID-based anti-counterfeiting, and addresses possible implementation issues, such as tag selection, product tagging, tag programming and locking. A packaging line for bottled products is developed and integrated with the proposed system for investigation of these issues. Experiments are conducted to determine the critical tag moving speed beyond which the tag programming rate or reliability of tagged products being transferred on a conveyer drops significantly. The critical tag moving speed is vital not only for determining the maximum production throughput possible, but also for setting up RFID equipment needed to ensure tagged product
4. In the year 2006 William Burns, Geneva proposed WHO will launch a taskforce in late 2006 to fight a thriving multimillion-dollar illegal trade in counterfeit drugs, vaccines and other medical products. The International Medical Products Anti-Counterfeiting Taskforce (IMPACT) aims to put a stop to the deadly trade in fake drugs, which studies suggest kill thousands of people every year. "We need to help people become more aware of the growing market in counterfeit medicines and the public health risks associated with this illegal practice," said Dr Howard Zucker, Assistant Director-General for the Health Technology and Pharmaceuticals cluster of departments at WHO. The taskforce will encourage the public, distributors, pharmacists and hospital staff to inform the authorities about their suspicions regarding the authenticity of a drug or vaccine. In a parallel move, the taskforce will help governments crack down on corruption in the sections of their police forces and customs authorities charged with enforcing laws against drug counterfeiting.
5. In the year 2001 Abiodun Raufu, Ibadan proposed Nigeria has been at the forefront of global efforts to fight



counterfeit drugs since Dora Akunyili took over the National Agency for Food and Drug Administration and Control (NAFDAC) in 2001. To crack down on counterfeits, her first move was to stamp out corruption within her own agency as far as possible. In five years Akunyili, a 52-year-old professor of pharmacology, has attained celebrity status in Nigeria because of her uncompromising stand against corruption. "We have been rebuilding NAFDAC from a moribund government agency to [one that meets] international standards," she told the Bulletin. Nigeria is ranked as one of the most corrupt countries in the world, according to Transparency International. Before Akunyili took over, staff abused their position to extort money from honest manufacturers at the same time as taking bribes from counterfeiters in return for access to the Nigerian medicines market. Akunyili fired the most corrupt of her officers.

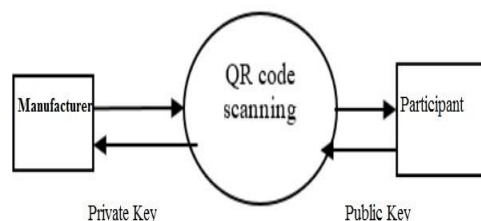
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IV SYSTEM ARCHITECTURE:



V. DATA FLOW

1. The DFD is also called as bubble chart. It is a simple graphical formalism that can be used to represent a system in terms of input data to the system, various processing carried out on this data, and the output data is generated by this system.
2. The data flow diagram (DFD) is one of the most important modeling tools. It is used to model the system components. These components are the system process, the data used by the process, an external entity that interacts with the system and the information flows in the system.
3. DFD shows how the information moves through the system and how it is modified by a series of transformations. It is a graphical technique that depicts information flow and the transformations that are applied as data moves from input to output. DFD is also known as bubble chart. A DFD may be used to represent a system at any level of abstraction. DFD may be partitioned into levels that represent increasing information flow and functional detail.



VI. PROPOSED METHODOLOGY

we have proposed Medical chain storage using permissioned blockchain and how counterfeit drugs will be tracked. It produces the secure channel for drug safety among various participants like Manufacturer, Distributor, Patient, Hospital. This data is known and distributed to all participants in medical chain framework. This structure shows here transparency between the participants. Blockchain's advanced features make it capable of providing a basis for complete traceability of drugs, from manufacturer to end consumer, and the ability to identify counterfeit drug.

**VIII. CONCLUSION**

The proposed Framework represent blockchain based secure infrastructure for medical chain supply among valid participants. The mentioned framework can provide drug security as well as authenticity of manufacturer. The Current medical chain framework is working on third-party trust which is not very secure for the drug safety. The proposed methodology based on PKI and digital signature which can prevent from replay and man- in-middle attack.

IX. REFERENCES.

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