# BUSINESS PROBLEM

In today's increasingly interconnected world, ensuring the transparency and trustworthiness of vaccine distribution has become a critical imperative.

Many people are hesitant to be vaccinated . It has been reported that people are hesitant to receive vaccines because of the negative information that they have been presented with on social media sites about the side effects of vaccines.

In other words, anxiety and the fear of foreign-made, fake, and low-quality vaccines have discouraged vaccination.

The circulation of fake vaccine passports to take advantage of loopholes regarding behavioral restrictions placed on those who are unvaccinated is even an issue.

the circulation of low-quality and counterfeit vaccines seriously affects human health and the reputation of real vaccine manufacturers (VMs) and increases the amount of fear concerning vaccination. Middle class people cannot afford for the high quality vaccines .

This circulation of counterfeit vaccine passports has caused a variety of problems, including nonimmunized people spreading the virus and people who think about getting vaccinated believing that they do not have to face the risk of getting vaccinated and, thus, do not do so. As a result, the ultimate goal of vaccination, which is to achieve population immunity, becomes difficult to achieve.

People can not access with the real time data that’s why counterfeit vaccines are increasing. We are going to make people to access with the real time datas of the vaccine from supplier to end user.We are also going to provides a trusty vaccine passport solution to prevent the circulation of fake vaccine passports.

The business problem in Vaccine Tracking Smart Contracts on Ethereum Block chain revolves around the need to enhance the transparency and security of supply chains. Counterfeit vaccines and substandard medications pose significant risks to public health, and traditional tracking methods are often insufficient. Implementing a smart contract solution on the Ethereum block chain aims to address this problem by enabling real-time, immutable, and transparent tracking

of vaccines throughout the supply chain, ensuring that consumers receive genuine and safe medications while facilitating regulatory compliance for pharmaceutical companies Block chain technology is a decentralized, distributed ledger system that provides an efficient and trusted solution for product traceability. Block chain technology powers the crypt currencies and has been applied to variety of industries such as banking, supply chain, energy, commodities trading, health care and many businesses involving transaction processing. To deal with the issue of counterfeit vaccine, block chain technology has the potential to provide pragmatic solution for vaccine traceability and provenance in a secure and immutable manner. Block chain technology enables the creation of a distributed shared data platform for storing and sharing the transaction data among various supply chain stakeholders ensuring the information remains accessible, immutable, transparent and secure via cartographic techniques and accessible only to authorized parties. Thus, provides a proactive approach to track, detect, and manage counterfeits in vaccine supply chains. In this paper, we reflect on the potential and the limitations of block chain technology for vaccine traceability. We describe the current block chain enabled trends and describe two state of the art architectures, provide explanations on how these architectures are robust, secure, and scalable to provide better transaction privacy compared to existing solutions, and discuss potential opportunities for securing the vaccine supply chain.

The major contributions of our work are as follows:

- We discuss the reasons how the vaccine supply chain benefits from a block chain-enabled drug traceability solution.
- We highlight the key benefits of using block chain solution for vaccine supply chain compared to existing solutions.
- We present two suitable block chain architectures for vaccine traceability.
- We identify, enumerate, and discuss several future research challenges that may hinder the successful deployment of blockchain solutions in the vaccine supply chain.

In this study, to address the abovementioned serious problems, we propose a vaccine tracking system, named "***Vacchain***"

An overview of our proposed system is shown below, which shows several entity roles, such as SYS-MAN, VM, vaccine authorized organization (VAO), vaccine authorized distributor (VAD), and USER. Information on the abovementioned entities and vaccines is stored in a distributed ledger—the Vacchain ledger. The VM represents the company that manufactures the vaccine. Only the VM is able to record information on vaccines such as vaccine name, type, and ingredients into the Vacchain ledger. The VAO is the organization that approves the vaccine and is assumed to be a government agency of a country. The VAD may be an organization that buys and distributes vaccines, an express company that transports the vaccine, or a hospital that administers the vaccine. The USER is the vaccine beneficiary. The SYS-MAN is the manager of the system, which verifies the trust of other entities such as the VM, VAO, and VAD. The SYS-MAN acts as a guardian that protects the reliability of the data recorded in the Vacchain ledger and thus plays an important role in securing the network. The system is supposed to have multiple SYS-MANs, VMs, VAOs, VADs, and USERs.