Blockchain vs. COVID-2019: Reflections on National Notifiable Disease Report System (NNDRS) and China Infectious Diseases Automated-alert and Response System (CIDARS)

Charles Chang

Deputy Dean of Academics, Director of Fudan Fanhai Fintech Research Center

Chaoying Qi

Postdoc at Fudan Fanhai Fintech Research Center

Summary

The COVID-19 outbreak has exposed the limitations of the existing infectious disease report information management system and automated-alert information system and helped us find a new scenario that can benefit from the blockchain technology. This article examines current NNDRS and CIDARS in China and analyses the limitations from a structural and systemic point of view. Under this idea, we propose the preliminary form of the blockchain that we can apply to the infectious disease reporting and warning system. This article explains how to reduce the current limitations or solve existing problems via blockchain adoption. We also describe the changes that blockchain technology can bring. There is also a certain degree of system design in Section 3 and Section 4.

Through the study of NNDRS and CIDARS, we find that in the current systems, only when a certain number of infectious disease cases are confirmed can the relevant national authorities notice it. At the same time, limited by the current multi-level contagious disease reporting system, it takes a certain amount of time to collect individual reports from local hospitals and clinics, which further slows down the speed of report submission and information integration. At the same time, at the local level, the information volume of an individual health department is limited. Because they cannot have a large number of case samples or benefit from the shared information architecture, they can only observe local situations. Therefore, once people affirm that an outbreak has occurred, even if it is out of good faith, individuals who have been misled by other information may further mislead the condition to discover or aggravate the adverse reaction. In short, the entire reporting process has low transparency and lacks horizontal data sharing among various agencies.

Regarding the limited system, blockchain technology can make a particular contribution. As a set of publicly trusted technical solutions, blockchain technology is potentially to become an essential component of new infrastructure projects and the breaking point of the current reporting and early warning system and drive the growth point of the information technology industry in the future.

Therefore, this article suggests that we need to establish an efficient, transparent, safe, and reliable system that can detect anomalies promptly, quickly compare verification data, effectively share information, judge outbreak as accurately as possible, and can on relevant personnel. And the organization takes timely response measures. At the same time, this system also has an accountability mechanism and incentive mechanism than the current one.

These are precisely the “specialties” of blockchain technology (including Smart Contract technology). But the system established here should be different from the fully distributed ledger. Because this is a public health issue, the blockchain adopted in the infectious disease reporting and early warning system is inherently a distributed one. Still, it can be better monitored by central agencies.