

Chapter 16

Blockchain Applications in the COVID–19 Era

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ABSTRACT

In the difficult times of history, human beings sought a solution to the crisis by using the existing technological facilities outside of the structure used until that day or by further developing the technology. The COVID-19 outbreak, which affected the whole world in 2020, also increased the diversity and use of blockchain applications. The first coronavirus case in China and then declaration of COVID-19 by the World Health Organization as a pandemic caused countries to be extremely unprepared for this epidemic. The fact that the pandemic is felt in almost every area of daily life has forced individuals to digitalize their daily work and habits. In this study, the existing and innovative blockchain applications developed against the epidemic during the pandemic process will be discussed, and possible future opportunities will be mentioned.

INTRODUCTION

In 2007, the financial crisis based on the mortgage system in the United States of America (USA) caused many banks and financial institutions to go bankrupt and a global economic crisis broke out. The USA government transferred individuals' taxes to save the banks and ended the crisis by printing money decreasing the confidence in banks and the government.

While people were looking for an alternative financial system and currency, Satoshi Nakamoto published his famous article titled "Bitcoin: A Peer-to-Peer Electronic Cash System" in 2008, revealing a digital currency called Bitcoin and the Blockchain technology behind it (Nakamoto, 2008). Although the article did not come out as a response to this crisis, it fixed many things that caused people to lose confidence in the financial system. For example, while there was not any information regarding the financial resources that the states will emission, it was declared that 21 million coins in the digital currency of Bitcoin would be mined. Besides, the codes of the system were made available to everyone as open-

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source, allowing everyone to access the system, which is not managed by any authority (decentralized). As Bitcoin money transfers are transparent in a way that everyone can observe and are not audited and managed by authorities such as a public institution or bank, the identity of the account holders is confidential or anonymous. All transactions are verified using private and public digital signatures, and thus the transactions made are undeniable/immutable. This created a revolution in the finance sector and led to a new era. All these features increased individuals' interest in the Bitcoin currency in a very short time.

In January 2020, the first coronavirus case in China and then the declaration of a pandemic by the World Health Organization (WHO) left the countries extremely unprepared for this epidemic. The last time such a global health epidemic around the world broke out was in 1918, the Spanish flu. Naturally, since none of the current generations has experienced such an epidemic, no state or institution had any preparations. Since pandemics endanger people's health and lives, they have a negative impact on all areas of life, even greater than an economic crisis.

Countries around the world started imposing various restrictions on their citizens and even advised them to stay at home eventually creating several disruptions in several domains. With the announcement of quarantines on a country basis, several daily practices were digitalized such as employees started working remotely and students continued their studies from distance.

From the day that the Covid-19 pandemic was observed, January 2020 until September 2021, approximately 226 million people worldwide contracted the disease, and close to 4.6 million died (Worldometer, 2021). According to the 2021 World Economic Outlook Report published by the International Monetary Fund (IMF), the global economy shrank by 3.5 percent in 2020 causing the deepest economic recession since the end of the Second World War (Levy Yeyati & Filippini, 2021). The two-year economic loss of the Covid-19 pandemic is estimated to be \$8.5 trillion globally (UN, 2020).

Blockchain has various characteristics such as providing anonymity and decentralization. The main aim of this study is to examine the existing and innovative blockchain applications within the scope of combating the Covid-19 pandemic. Therefore, the following section starts with basic definitions and terms related to blockchain. The main characteristics of blockchain and its working principle are explained. In line with the main purpose of this book chapter, the blockchain applications developed and recommended during the Covid-19 pandemic process will be analyzed. Finally, some solutions, recommendations, and possible future opportunities are discussed.

BACKGROUND

Throughout history, in times of crisis individuals try to find a solution using existing technology or by developing new technology. The Covid-19 outbreak increased the diversity and use of blockchain applications. Blockchain technology, which entered our lives with a digital currency named Bitcoin, is more than a simple cryptocurrency. Blockchain applications are integrated into existing business processes by being efficient, fast, accessible from anywhere, and secure due to their transparent, reliable, undeniable, and decentralized features.

In this context to combat the epidemic, various applications are developed and used by states and companies. For example, transparent medical equipment supply agreements were made to keep the blockchain process in a digital environment. Based on the undeniable nature of their architecture, blockchain applications were developed to observe the spread of the epidemic and the vaccination process. Due to the anonymity of blockchain, medical recording applications were developed to protect patients' privacy.

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