Chapter 5
Blockchain-Powered Collaboration in Spatial Data Infrastructure

Munir Ahmad
https://orcid.org/0000-0003-4836-6151
Survey of Pakistan, Pakistan

ABSTRACT

Blockchain is being adopted in different sectors such as health strategies and services, production chains, school systems and business management, manufacturing, emergency response systems, farming and food production, travel and hospitality, and power distribution. Indeed, this makes it also relevant for the consideration of the SDI. This chapter explored the potential of blockchain technology for SDI and examined its potential role in addressing key areas of concern regarding SDI: Governance Structure, Features that make an institution more accessible, Capacity Building, and Interoperability of Data. In addition, the chapter also offers a reflection on the implications that may be associated with integrating the blockchain technique into SDI. Some of the difficulties include system deployment, technical issues, legal issues, and permissions besides being aspects of cost and resource concerns.

INTRODUCTION

Spatial Data Infrastructure (SDI) is a framework to maintain as well as distribute spatial data to reach out to a broad audience including government departments, non-governmental departments, academic institutions, and the public (Masser, 2019). It allows different players to exchange and apply spatial data in the course of accomplishing distinct tasks. Nevertheless, there exist several imperatives with

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respect to SDI that require consideration, including governance, scalability, data heterogeneity and interoperability, data ownership and rights, access, and security. To mitigate some of the challenges highlighted above, the application of blockchain technology could present a feasible solution. The ramifications of blockchain integration into SDI include the ability to decentralize, secure, and make processes transparent and efficient thus enhancing the management of spatial data.

In the past few years, people have shown increasing concern about adopting blockchain technology in all fields (Ahmad, 2024; Bodkhe et al., 2020), such as health, supply chain, education, disaster response, and more. They suggested that with the application of blockchain technology, there can be easy establishment of a decentralized and distributed database that is safe, secure, and transparent which can enhance the management of data and its sharing in a secure manner (Monrat et al., 2019). The use of blockchain technology will also help to eliminate challenges normally associated with traditional SDIs such as data integrity, compatibility, and ownership (Ahmad, 2023).

This results in the key research question of this chapter: To what extent can blockchain technology be effectively combined with SDI and what challenges should be considered whilst doing so, as well as what recommendations can be made in this context? The chapter also provides a technological, social, and legal perspective on blockchain-powered SDIs. While looking for answers to the research questions, the conceptual framework inspired by Masser, (2019) based on four pillars that define the future facets of SDI is also explored. The four pillars include governance structures, stakeholder access, capacity development, and data integration.

This chapter is structured as follows: First, the notion of SDI and blockchain is introduced. The second section explained the conceptual framework used to conduct this research. The next section outlines the prospects of incorporating blockchain into SDI. The issues arising from this integration are discussed in section four. The next section presented a discussion of the results. The last section concludes the debate with suggestions for future research directions.

THEORETICAL BACKGROUND

This section presented a detailed description of two fundamental concepts: blockchain and spatial data infrastructure to get a wider understanding of the subject matter of the research