Chapter 7
DeSci and Tokenized Science Economies:
Rewiring Research Incentives With Blockchain

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ABSTRACT

This chapter delves into the rise of tokenized science economies, where blockchain infrastructure redefines how we fund, govern, and share scientific knowledge. At the heart of this shift is Decentralized Science (DeSci), a movement that challenges legacy systems by embedding transparency, programmability, and economic alignment into the research lifecycle. Through real-world case studies, the chapter explores tools like intellectual property NFTs, tokenized research outputs, DAO-led funding models, and scientific prediction markets. Together, these mechanisms offer new ways to incentivize peer review, coordinate global collaboration, and democratize access to discovery. Framing tokenization as a structural innovation, the chapter makes the case for a research economy that is not only open and sustainable, but fundamentally interoperable across platforms, disciplines, and communities.

1. INTRODUCTION

1.1 From Centralized Science to DeSci

Modern science emerged as a public, collaborative enterprise governed by communal norms: communalism, universalism, disinterestedness, and organized

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skepticism (Merton, 1973). Over the past half-century, however, the research system has been progressively financialized and bureaucratized: funding concentrated in gatekeeping agencies, evaluation outsourced to opaque peer-review cartels, and intellectual property (IP) enclosed within university–industry technology transfer offices (Mirowski & Sent, 2007; Mirowski, 2011; Sarewitz, 2016). The result is a growing misalignment between what advances knowledge and what advances careers: publishable novelty trumps cumulative verification, proprietary licensing trumps open reuse, and incremental grant-friendly projects crowd out high-risk exploration (Nosek et al., 2015).

Against this backdrop, Decentralized Science (DeSci) has emerged as a heterogeneous movement that applies cryptonative primitives: blockchain networks, token economies, smart contracts, decentralized autonomous organizations (DAOs), to rebuild scientific infrastructure around transparency, programmability, and incentive alignment (Asgaonkar & Krishnamachari, 2018; Bamakan et al., 2022; Bischof et al., 2022; Buterin et al., 2019; DeFrancesco & Klevecz, 2022; Fantaccini et al., 2024; Shilina, 2023; Weidener and Spreckelsen, 2024; Weidener & Boltz, 2025; Weiss, 2022). Rather than treating papers, data, and peer review as static artifacts governed by slow institutions, DeSci treats them as on-chain objects whose provenance, access rules, and financial flows can be natively coordinated across networks (Nielsen, 2012; Buterin, Hitzig, & Weyl, 2018; De Filippi & Wright, 2018). Tokenization is not an add-on; it is the economic substrate that allows communities to fund, govern, and verify research in ways that are legible and enforceable without centralized trust (Heines et al., 2021).

1.2 Why Tokenization Matters for Research

Tokenization refers to the process of converting the core elements of scientific labor (ideas, datasets, experimental protocols, peer review contributions, and researcher reputation) into automatable, exchangeable units that can be tracked, governed, and incentivized across distributed systems. Unlike static, PDF-bound outputs or siloed databases, tokenized representations of scientific work are composable: they can interface with smart contracts, governance modules, and financial protocols. When carefully designed, token systems align incentives with epistemic value by rewarding activities such as replication, data curation, methodological rigor, and constructive critique, behaviors often undervalued in conventional academic metrics that prioritize novelty and citation accumulation.

Tokenized mechanisms also unlock new financial architectures. Communities can pool capital through DAOs, issue IP-backed tokens that fractionalize ownership of emerging knowledge assets, and stream micro-payments directly to contributors based on real-time milestones or post hoc impact. Governance becomes embedded

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