

High Interest, Low Adoption. An Exploratory Investigation into the Factors Influencing Organizational Adoption of Blockchain Technology

Atefah Mashatan, Milad Dehghani and Ryan William Kennedy
Cybersecurity Research Lab, Ted Rogers School of Information Technology Management,
Ryerson University

Introduction

What is Blockchain?

It was first introduced by Satoshi Nakamoto with *Bitcoin*. We define blockchain as a novel form of an append-only *cryptographically linked-list* of blocks stored on a public or private network.

Benefits?

Provides direct peer-to-peer transactions in a trust-less environment, near real-time transaction settlement/reconciliation, instant tracking and tracing of assets, data provenance, tamper evident data, irreversibility, distributivity, efficiency gains, cost reductions, automated contracts, and a security model that is fault tolerant and resilient.

Motivation?

Statistics show **high levels of interest in blockchain but considerable organizational adoption has not occurred**. If the benefits of blockchain technology are to be realized; organizations must adopt, implement, and make use of it in production. **The problem this study examines is** the opaque nature as to why there exists so much interest in blockchain technology yet such low levels of adoption.

Background

Research Question: What are the drivers and barriers influencing organizational adoption of blockchain technology?

Objectives: Identify the factors influencing blockchain's adoption and systematize them into an exploratory framework.

Methodology

Research Type & Design: Qualitative multiple-case study research design in the form of semi-structured interviews was used.

Participants: A total of 25 interviews with 23 North American organizations from 12 unique sectors. The sample consisted of blockchain start-ups, blockchain service providers, large financial organizations, governmental entities at all three levels, consulting firms, and large technology providers all at varying stages of their blockchain development.

Analysis: A content analysis was conducted using NVIVO 12. Adoption factors were highlighted, coded, organized according to similarity and synthesized into well-defined categories according to The Technology, Organization, Environment Framework (TOE). The categories represent the variables in the exploratory framework, which represent blockchains' adoption drivers and barriers.

Results

Analysis revealed **21** adoption factors and **4** sub-factors. A total of **7** of the 22 factors are considered drivers and **14** are considered barriers. In addition a **relational context** was added to the TOE framework.

Technology Factors: Data Quality, Financial Cost, Functional Benefit, Complexity, Information Privacy Risk, Technological Volatility, Scalability, Interoperability, Security Risk, and Decentralization. **Sub-Factors – Revenue Cannibalization and Identity Management Complexity.**

Organization Factors: Level of Technological Knowledge, Risk, Compatibility, and Brand Reputation. **Sub-Factor – Tokenization Risk.**

Environment Factors: Regulatory Uncertainty, Standardization, External Pressure, and External Technical Support.

Relation Factors: Trust Enhancement, Shared Governance, and Network Enhancement. **Sub-Factor - Transparency**

Number	Adoption Factor	Number of Nodes	Driver or Barrier	Context
1	Perceived Data Quality	47	Driver	T
2	Perceived Regulatory Uncertainty	41	Barrier	E
3	Perceived Financial Cost	40	Barrier	T
	Sub - Perceived Revenue Cannibalization			
4	Perceived Technological Knowledge	33	Barrier	O
5	Perceived Risk	32	Barrier	O
	Sub - Perceived Tokenization Risk			
6	Perceived Trust	31	Driver	T
	Sub - Perceived Transparency			
7	Perceived Level of Standardization	30	Barrier	E
8	Perceived Functional Benefits	30	Driver	T
9	Perceived Shared Governance	29	Barrier	R
10	Perceived Compatibility	27	Barrier	O

Table 1 -Top Adoption Factors

Discussions

Technology

- Data Quality: Blockchain's ability to provide tamper-evident data, reduce single-points-of-failure, achieve a single version of the truth and enhance auditability that increases the quality, accuracy, completeness, availability, and usability of the data.
- Financial Cost: Organizations perceive the direct costs to set up, operate and maintain a blockchain solution to be large, and made note of possible financial loss due to cannibalization of an existing revenue stream.

Organization

- Technological Knowledge: To implement a blockchain solution, fully realise the benefits, and avoid costly mistakes, a full understanding of the technology is necessary. Organizations perceive the level of technological knowledge of their employees to be insufficient.
- Perceived Risk: Our interviewees explained how risks lie in aspects such as backward compatibility, data permanence, upgrades, smart contracts, and tokenization.

Environment

- Regulatory Uncertainty: Organizations are concerned with the lack of current regulations and the uncertainty regarding future regulations. They are also concerned about the General Data Protection Regulation (GDPR). Information within a blockchain is hashed, but GDPR considers the hash of PII to be PII meaning if an organization is using a blockchain with hashed PII, they may be forced to abolish the blockchain due to the right to be forgotten.
- Standardization: The lack of standards now will result in fragmented standards in the future. This holds back current development and adoption.

Relation

- Trust Enhancement: Organizations are motivated to adopt blockchain technology to increase trust within their business networks by making data more transparent.
- Shared Governance: Some blockchain orchestrations connect several organizations within a network. Thus, the question of governance is vital. Organizations must consider data ownership, when and how network updates will occur, how the costs will be divided, and so on. The organizations interviewed in this study were concerned with the difficulty associated with establishing shared governance.

Implications

Theoretical: First, a new exploratory-theoretical framework of blockchain's adoption factors. It contains three novel factors (highlighted in **green** in the results section). This extends the existing literature about technological adoption and the literature on blockchain technology in general. Second, a theoretical extension of the TOE Framework to include a relational context, creating the Technology-Organization-Environment-Relation Framework (TOER), has been made .

Practical: Three main audiences can benefit from this research; organizations considering or working toward adopting blockchain technology in production, blockchain consulting organizations and government regulators.

Figure 1 - Exploratory Theoretical Blockchain Adoption Framework

