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Using UTAUT for Blockchain Assessment

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ABSTRACT

With over 1,000 public and private blockchains, an acceptance model can facilitate an objective and comparative assessment of existing and future solutions. The novelty of this paper is a new methodology of assessing blockchains using the Unified Theory of Acceptance and Use of Technology (UTAUT) alongside the distinguishing characteristics of blockchain implementations: trust, utility, and support. The paper distinctly aggregates existing approaches to present a concise assessment model. The distinguishing characteristics of trust, utility, and support in the context of UTAUT are beneficial for comparing and evaluating the myriad blockchain implementations. The research encourages the examination of existing and future solutions using the UTAUT-focused attributes. The study has broader implications for blockchain solutions by providing contextual constructs necessary for acceptance and use.

KEYWORDS

Blockchain, Distributed Ledger Technology, DLT, Governance, Scalability, Security, Support, UTAUT

INTRODUCTION

"Blockchains are tamper-evident and tamper-resistant digital ledgers implemented in a distributed fashion (i.e., without a central repository) and usually exist without a central authority (i.e., a bank, company or government." (Yaga et al., p 1, 2018). In 2008, the combination of blockchain and other technologies started cryptocurrencies, with 2009 being the genesis block of Bitcoin (Nakamoto, 2008). Blockchain technology has four primary characteristics: 1) a ledger containing a transactional history, 2) security assurances for the integrity of the network, 3) transactions and contents, and 4) ledger distribution. The blockchain consists of two primary architectures categories: permissionless and permissioned. Permissionless blockchains are accessible to anyone, while permissioned architectures require authorization via an authority. A blockchain network architecture includes hashes, transactions, ledgers, and blocks. The models for achieving consensus, a single model of truth, vary among solutions.

Evaluating blockchain solutions is challenging. A myriad of options awaits enterprises seeking to leverage blockchain's capabilities. In addition to the number of choices, discerning amongst available Blockchains is complicated by similar naming conventions (Bitcoin, Bitcoin Cash, Bitcoin SV, First Bitcoin, ByteCoin), similar foundational code (Ethereum-based, Bitcoin-based, ZCash-based, Polkdadot-based), competing vendors (Amazon, IBM, Microsoft), and an ever-evolving software and supporting ecosystems. Blockchains are prototypical of systems theory with open and interactive environments resulting in continuous improvement and evolution. Therefore, objectively evaluating the benefits of blockchain is necessary and relies on understanding the core capabilities

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and distinctions among the available options. Iteration through existing solutions is an arduous task where conflicting, out-of-date, and potentially disingenuous information resides. Furthermore, organizations have few resources to assess viable options. The paper seeks to clarify the evaluation and assessment of blockchains using the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003).

UTAUT identifies four primary independent constructs (performance expectancy, effort expectancy, social influence, and facilitating conditions) that impact behavioral intention and use behavior. The study associates blockchain attributes to the UTAUT independent constructs that affect acceptance – perceived usefulness and ease of use. The blockchain attributes include trust, utility & architecture, and support. Utility and architecture are the functional attributes of the blockchain, while support is a nonfunctional attribute. The functional attributes are associated with performance and effort expectancy. The nonfunctional attributes are associated with facilitating conditions and social influence. Associating specific attributes to acceptance will help businesses evaluate blockchains as well as assist future blockchain development.

The study consists of three additional sections. Section 2 provides a literature review of blockchain attributes and UTAUT. Section 3 offers the research approach and methodology. Finally, section 4 provides a summary, implication, limitations, and future research.

LITERATURE SURVEY

Blockchains emerge, evolve, and fork over time. Bitcoin (Nakamoto, 2008) and Ethereum (Buterin, 2013) demonstrate the dynamic nature of blockchains. The capabilities and unique distinctions of blockchain have become a source of interest for enterprises. Multiple taxonomies to classify and explain the fundamentals of blockchain are available in literature (Tasca and Tessone (2017), Xu et al. (20017), Yaga et al. (2018). Taxonomies offer definitions including common architecture and core terms to compare blockchains. The taxonomies serve as a foundation for further research into the technology but not for assessment. Subsequent studies have compared various blockchains and their attributes (Valenta and Sandner, 2017; Pongnumkul et al., 2017). Emerging research has provided an opportunity to leverage taxonomies and preliminary blockchain analysis to propose an assessment framework. Based on the available literature, this study offers a method of evaluation using taxonomies, analysis, and Information Systems theory. The literature demands research into blockchain platforms to aid the measurement and assessment of value for the industry. Risius and Sphrer (2017) state, "Regrettably, very little research has empirically investigated the strategies and tactics applied by companies or industries when working on a new blockchain solutions or action on existing blockchains" (pg. 399).

Blockchain technology is maturing through the aggregation, evaluation, and advancements in literature. Bhutta et al. (2021) demonstrate various blockchain-specific topics in their survey of blockchain technology literature, highlighting specific attributes including preliminaries, evolution, architecture, security, and features. Additionally, the survey started to propose unified blockchain terminology. The blockchain literature is expanding from definitions towards benefits for diverse business cases (Gupta et al., 2020). Articles exploring blockchain technology opportunities in supply chain operations (Dutta et al., 2020), healthcare applications (Tanwar et al., 2020), construction (Perera et al., 2020), and agriculture (Feng et al., 2020) are emerging as research explores the impact of this technological innovations. Kimani et al. (2020) examine the prospects of blockchain technology on business functions while weighing the unique considerations and drawbacks.

Several articles have attempted to assess the value of blockchain technology. Carson et al. (2018) explained the value of blockchain in low-trust environments, immutability of data, secure infrastructure, and determination of truth. The value of blockchain supports the authors' categories of potential use cases – static registry, identity, smart contracts, dynamic registry, and payment infrastructure. Mulligan et al. (2018) provided a decision tree tool for rapid blockchain analysis as