The Diffusion of Blockchain Technology for Financial Reporting Functions Seen Through the Lens of Norm Lifecycles

Author(s): King, Tatiana; Morton, Elizabeth

Title: The Diffusion of Blockchain Technology for Financial Reporting Functions Seen Through the Lens of Norm Lifecycles

Year: 2025

Version: Accepted manuscript

Please cite the original version:

King, T., & Morton, E. (2025). The Diffusion of Blockchain Technology for Financial Reporting Functions Seen Through the Lens of Norm Lifecycles. In T. King & J. Williams (Eds.), *Corporate Governance in the Banking and Financial Sector: Innovations and Adaptations in a Changing Landscape,* 257-299. Palgrave Macmillan Studies in Banking and Financial Institutions. Palgrave Macmillan. https://doi.org/10.1007/978-3-031-83353-3_10

Chapter 10

The diffusion of blockchain technology for financial reporting functions seen through the lens of norm lifecycles

Tatiana King[1] and Elizabeth Morton[2]

10.1 INTRODUCTION

There is a tendency to talk about blockchain in very singular, reverential, almost religious tones… This is more than a distributed database, this is less than holy water - this is somewhere in between the two.

Hyperledger executive director Brian Behlendorf (cited in Reed, 2017)

Concern has been expressed about the process of blockchain technology adoption and the pace at which it occurs in a financial accounting and reporting context (e.g., Atzori, 2017; Dai & Vasarhelyi, 2017; Kokina et al., 2017; Tharapos & Marriott, 2020). In a 2020 report, PricewaterhouseCoopers (PwC) recognized the impact of blockchain technology in a broad context based on its five main benefits: provenance that helps organizations verify the sources of their goods and track their movements; improvements in payment systems and their effects on financial institutions; improved identity (e.g., Know Your Client 'KYC') leading to cost efficiencies and the curbing of fraud and identity theft; contract and dispute resolution resulting from the merger of ledgers, contracts, and payments; improved flow of commercial agreements; the flagging of disputes; and enhanced customer engagement through integration

[1] Tatiana King is a ….
[2] Elizabeth Morton is …

with customer relationship management platforms. Due to these benefits, blockchain technology has the potential to boost global domestic product (GDP) by up to US$1.76 trillion by 2030 (PwC, 2020; Panetta, 2018).

Casey and Vigna (2018, p. 64) describe a blockchain as a "distributed, append-only ledger of provably signed, sequentially linked, and cryptographically secured transactions that is replicated across a network of computer nodes, with ongoing updates determined by a software-driven consensus". Blockchain technology has been adopted across a broad range of business sectors (see, for example, Allen et al., 2020), and it is believed to offer substantial benefits for accounting and auditing functions (ACCA, 2017; Garanina et al., 2021; Kotb et al., 2020; PwC, 2020; Schmitz & Leoni, 2019; Tharapos & Marriott, 2020; Yu et al., 2018). Blockchains' inherent features of trust, transparency, and openness complement the UN's Sustainable Development Goals (SDGs)—in particular, economic growth, industry innovation, and infrastructure (United Nations, 2020)—and have the potential to offset shrinkage in global GDP stemming from the COVID-19 pandemic. Importantly, blockchains may develop differently across or within institutions at differing time points (Brunnee & Toope, 2000; Sunstein, 1996). Institutions in turn are shaped by their adoption (or rejection) of new technologies, such as blockchains, which may create or sustain efficiencies in current practice and/or further establish new (disruptive) practices (Brennan et al., 2019; Carlin, 2019; Kend & Nguyen, 2020).

In this chapter we offer a novel framework that complements the extant literature on blockchain technology. We merge two theories: (1) diffusion of innovation theory (Rogers, 1962, 1983, 2003) and (2) norm lifecycle theory (Bebbington et al., 2012; Brunnee & Toope, 1997; Finnemore & Sikkink, 1998; Morton, 2019; Sunstein, 1996, which help us provide a contextualized understanding of blockchain technology's potential diffusion in financial reporting functions. In doing so, we aim to clarify and contextualize blockchain technology's impact on financial reporting functions based on differing stages that underpin the norm adoption lifecycle. The framework considers social attitudes regarding what ought or ought not to ultimately drive developments in standards or practices (Krasner, 1982; Sunstein, 1996), described as norm lifecycles (Bebbington et al., 2012; Brunnee & Toope, 1997; Finnemore & Sikkink, 1998; Morton, 2019; Sunstein, 1996). We posit that blockchains can be obsolete, sustaining, or disruptive for the accounting profession, depending on when and where in the lifecycle they are adopted and for what particular aspects of accounting practices. Thus, for financial reporting functions, we present two critical limitations that hinder blockchain technology diffusion and lead to a critical tipping point for the technology to diffuse. We assert that blockchains are not yet normalized within these functions, depending on their relationships with central governance and the broader digital ecosystem.

The present study makes several contributions to literature. First, we enrich diffusion of innovation theory (Rogers, 1962, 1983, 2003) by linking it to the norm lifecycles that underpin norms in social contexts (Bebbington et al., 2012; Brunnee & Toope, 1997; Morton, 2019). Previously, innovation diffusion theory was criticized for not sufficiently considering external and social contexts (Anokhin & Schulze, 2008; Lyytinen & Damsgaard, 2001). Our study provides a more nuanced understanding and approach based on synergy between the two theories, thus providing an external context for innovation diffusion theory.

We reconciled these complementary theories to allow for multiple sources of normativity, going beyond the black-and-white positioning of blockchain technology. By exploring blockchain technology within a norm lifecycle framework, we aimed to clarify the literature on the benefits and limitations of blockchain technology and articulate blockchains' sustaining and disruptive reporting potential.

The present study contributes to the diffusion of innovation theory by applying it to the development of blockchain technology in the accounting domain, viewed through a norm lifecycle lens. Our findings, on a practical level, may help practitioners reflect on the stages of blockchain diffusion in an accounting context.

We structure the rest of this chapter as follows. First, we briefly outline blockchain technology, including the initial focus on distinguishing between private and public blockchains, then towards layering, stacking and multi-chains. This then leads to consideration of their applications, as both economic elements and economic infrastructures. We then present our conceptual framework, which combines diffusion of innovation theory with norm lifecycle theory and underpinned our analysis of the diffusion of blockchain technology and innovation adoption lifecycles. We outline norm emergence through knowledge and persuasion, the related barriers to norm cascading, and decision-making for blockchain technology adoption before considering the internalization of norms and the non-redundant role of central authorities. We then contemplate the way in which blockchain technology may alter stakeholders' needs and reorientate reporting entities. We conclude with our final remarks.

10.2 BLOCKCHAIN TECHNOLOGY

Blockchain technology broadly reflects the evolution of the digital economy and Internet capabilities. Although its early forms provided a means of payment (i.e., via Bitcoin), developments have accelerated over the last decade, particularly regarding increased functionality and, consequently, wider use cases deriving from the evolution of smart contracts, decentralized applications (DApps), non-fungible tokens (NFTs), decentralized finance (DeFi), and, most recently, decentralized autonomous organizations (DAOs) (Messari, 2021). Applications such as token systems, financial derivatives, stablecoins, identity (KYC), and reputation systems, decentralized file storage, and DAOs have been identified across blockchain communities (Ethereum, 2021).

Although Web 1.0 and Web 2.0 led to the substantial evolution of the economy by bringing economies and global activities together, blockchain technology accompanied the next evolution—Web 3.0 (Messari, 2021). By facilitating peer-to-peer networking, consensus mechanisms, and the sharing of data, blockchain technology represents a shift from an industrial to a digital economy by providing a new digital economic infrastructure. Data has become a vital economic resource, and consensus mechanisms enable trust to be industrialized (Berg et al., 2019).

10.2.1 *The foundations of blockchain technology*

Blockchain technology can be broadly described as a form of decentralized ledger technology (DLT) that records transactions in chronological order on a "block," which undergo a verification process (through a consensus mechanism) before transactions are confirmed and permanently added to a "chain" (Malekan, 2018).

Information is recorded, stored, and distributed across a network of users (i.e., nodes) that compose a decentralized system without a controlling entity or external influence (Malekan, 2018). For blocks of transactions to be entered permanently into a ledger, they must be verified by blockchain miners (i.e., timestamped), which is referred to as the consensus mechanism (Brennan et al., 2019; Malekan, 2018). Each block may include business-to-business and/or business-to-consumer (or vice versa) transactions, which can be shared across a distributed network of computers anywhere in the world. The resulting interconnected "blocks" form the "blockchain," which provides a complete history of transactions (a ledger) and is considered immutable—unable to be appended without substantial collusion between participants (Malekan, 2018). Therefore, blockchain technology is known as distributed ledger technology (Cong & He, 2019; Hinchliffe, 2019).

10.2.2. Public Blockchains, Layering, Tech Stacks, and Multi-Chains

Blockchain technology is an institutional governance technology that may function as an infrastructure for various financial and nonfinancial commercial uses (Hinchliffe, 2019). Traditionally, systems with centralized ledgers have required the participation of a trusted third party to maintain records of transactions between organizations. A distributed ledger eliminates the need to involve a third party, which can be a significant benefit when there is no clearly trusted central organization or if the costs of intermediation are high (Chartered Accountants Australia and New Zealand, 2017). However, not all blockchains are identical.

Early considerations of blockchain technology focused on a public/private distinction. The most notable blockchains are *public* (or *permissionless*) blockchains, such as Bitcoin or Ethereum blockchains. These are open and accessible to the public: anyone can participate, view transactions, and be involved in consensus mechanisms (Lin & Liao, 2017). Overall, the core features of public blockchains can be summarized as follows: a decentralized structure with no central authority, public accessibility and participation, transparency (at least regarding transaction addresses with pseudonymous users), and security via peer participation in the consensus mechanism.

Public blockchains can be contrasted with *private* blockchains (or *permissioned* blockchains), which retain central authority. The central authority controls who can participate and in what capacity, including what can be recorded. Therefore, unlike public blockchains, private blockchains suffer from a single point of failure limitation (Lin & Liao, 2017). One example of a private blockchain is the Australian Stock Exchange's (ASX's) DLT solution, which is scheduled to replace the clearing house electronic subregister system (CHESS) (The Australian Stock Exchange, 2020). The core features of a private blockchain include a centralized structure managed by a central authority, limited accessibility and participation controlled by a central authority, transparency (but limited to those with authority), and reduced security requirements due to a limited participant pool. Generally, private blockchains reflect enterprise solutions, such as for internal management, and prompt debate regarding whether they are *truly* blockchains.[3]

As blockchain technology continues to evolve, these distinctions are becoming less pronounced. The ability of underpinning public blockchains, such as Bitcoin and Ethereum blockchains (*layer 1*), to be overlaid with *layer 2* solutions resolves scalability and transaction speed problems (Wallace, 2020). Moreover, the explosion of blockchain activity has resulted in a substantial range of applications across a multitude of blockchains.

Importantly, this is creating opportunities for multi-chain, "modular" applications (Messari, 2021). Not only are trends ensuring interoperability and composability within blockchains, enabling "tech stacking," but bridging infrastructure is seen as a significant development that will come to fruition over the next five years (Messari, 2021).

10.2.3 Applications of Blockchain Technology

Blockchain technology underpins a broad range of digital economic infrastructures, including those for digital (private) money, assets, intellectual property rights, digital services and marketplaces, financing, and governance, to name a few (Messari, 2021). Blockchains have many uses, particularly for supply chains (i.e., provenance, protection against counterfeiting, and ensuring regulatory compliance) and credentialing and identity (e.g., KYC) (Dutta, 2020; Free & Hecimovic, 2021; Morton & Curran, 2021). Moreover, the COVID-19 pandemic has prompted a substantive shift in digital adoption, resulting in an increased willingness to adopt digital and distributed technologies (Allen et al., 2020; PwC, 2020).

Within the accounting profession, blockchain technology has the ability to simplify compliance and regulation (Deloitte, 2016), increase transparency in accounting processes (Kokina et al., 2017), improve auditing processes (CPA Canada, AISCPA, and UWCISA, 2017; Kotb et al., 2020), and facilitate tax collection (Bentley, 2019; Morton & Curran, 2021). However, the accounting, auditing, and taxation regulatory environment hinders the adoption of digitalization and automation for financial accounting and reporting (Deloitte, 2016). As

[3] Additionally, *consortium* blockchains enable groups of entities to collaborate and form blockchains. These represent a middle ground between public and private blockchains, in that they remain permissioned but are more decentralized and offer greater security due to a broader range of participants involved in consensus protocols (Lin & Liao, 2017).

Garanina et al. (2021) highlighted, there are four particularly important areas of development for the accounting field: the changing role of accountants, new challenges and opportunities for auditors, the challenges of blockchain technology applications, and the regulation of cryptoassets. The following subsections focus on core applications, first addressing different forms of digital assets, liabilities, and financial instruments, and then focusing on economic platforms, infrastructure, and entities.

10.2.4 Blockchains for Assets, Liabilities, and Financial Instruments

Blockchains have given birth to a vast array of private money and digital assets. Initially, blockchain technology attracted attention due to Nakamoto's white paper on Bitcoin, which examined the well-known cryptocurrency "genesis" block that was first minted at the beginning of 2009 (Nakamoto, 2008). Cryptocurrencies support peer-to-peer transactions without the need for a central bank (Nakamoto, 2008). While they are not money in a physical sense (Ramassa & Leoni, 2021), they reflect ledger entries on blockchains that are verified by miners and that are transparent to all participants. The critical difference between Bitcoin and other electronic forms of money is the way in which blockchains resolve the double-spend problem.

Besides private money, such as Bitcoin, stablecoins, central-bank digital currencies, and non-fungible tokens (NFTs) have emerged, raising questions about their accounting and taxation treatment in terms of both characterization and valuation (Hampl & Gyönyörová, 2021; Ramassa & Leoni, 2021). NFTs support a broader digitalization of property rights rather than cryptocurrencies and therefore provide access for communities and clubs, including the creative economy. Blockchain technology is also involved in initial coin offers (ICOs) for cryptoassets. Blockchain technology establishes infrastructure for decentralized finance (DeFi), thereby enabling decentralized financial products (such as liquidity pools, yield farming, or DeFi derivatives). Hence, blockchain technology has the potential to address issues such as debanking by financial institutions (AUSTRAC, 2021; Kornberger et al., 2017).

Overall, cryptoassets have an aggregate market capitalization of over $2 trillion, while cryptocurrency-based lending applications and decentralized trading venues currently command $65 billion in onboarded assets (World Economic Forum, 2021). The banking sector accounts for the highest distribution of blockchain market value and cross-border payments, and settlements comprise blockchain's largest use case (Statista, 2021).

According to Ramassa and Leoni (2021), there is a regulatory vacuum regarding accounting regulations and standard setting for cryptoassets because they have distinctive, rapidly evolving, but uncertain features. The pressures to regulate disruptive innovation inevitably result in standard setters trying to resist the pressures and defend their positions. Ramassa and Leoni's (2021) analysis of the International Accounting Standards Board (IASB) meeting recordings showed that the IASB currently considers cryptocurrency to be too complex and uncertain to warrant time-consuming standard updating or development.

10.2.5 Blockchains as economic platforms, infrastructure, and entity structures

Blockchain technology has led not only to the development of decentralized applications (DApps) that perform specific functions on blockchains, but more recently to decentralized autonomous organizations (DAOs) (Castonguay & Stein Smith, 2020; Johnston, 2020; Kornberger et al., 2017). Although numerous definitions exist, a DAO is a programmed blockchain entity that issues tokens to its stakeholders and completes its function(s) by executing smart contracts (Malekan, 2018). Rules that govern an organization and transactions undertaken therein are maintained and stored on the blockchain.

Although the introduction of DApps and smart contracts provides utility beyond money equivalents (Murray & Pirovich, 2018), DAOs attracted particular attention in 2021 due to the ability of communities of interested parties to collaborate toward a shared purpose through decentralized governance. DAOs therefore offer new forms of entity structuring that go beyond traditional companies or partnerships (Castonguay & Stein Smith, 2020; Sims 2019).

DAOs as new forms of decentralized entities do not fit readily into existing legal structures, although some jurisdictions have established new legal structures for DAOs (e.g., Wyoming, United States; Castonguay & Stein Smith, 2020,) and the consensus is that they are most likely to fall under the definition of a partnership (Sims, 2019; Tse, 2020). For the financial reporting function, this then leads into considerations of the reporting entity itself.

While numerous benefits exist, there are also concerns about blockchain infrastructure, including the anonymity of participants, the black economy, anti-money laundering and countering terrorist financing (AML/CTF; FATF, 2019), the energy requirements of proof of work consensus mechanisms (Dutta, 2020), and more general risks, such as the uncertain regulatory landscape and taxation ambiguity (Morton & Curran, 2022), to name a few.

10.3 CONCEPTUAL FRAMEWORK

As aforementioned, through the integration of two key theories, our chapter provides the reader with a contextualized understanding of blockchain technology's potential diffusion in financial reporting functions by linking the stages of social norm emergence with the stages of innovation diffusion.

The impact of blockchains and their scope for financial reporting are not dichotomous. Like other technological advances and shifts in practice, they evolve in different ways over time as entrepreneurs experiment in various settings (i.e., some experiments fail, while others are successful). To explain the stages of blockchain development and its influence on financial reporting, we developed a conceptual theoretical framework based on two theories—diffusion of innovation theory (Rogers, 1962, 1983, 2003) and norm lifecycle theory (Bebbington et al., 2012; Brunnee & Toope, 1997; Finnemore & Sikkink, 1998; Morton, 2019; Sunstein, 1996). In particular, we posit that blockchains' effects (and benefits) will only be fully understood once they are both implemented from an infrastructure point of view and normalized from the perspective of its users.

Rogers further developed the initial 1962 diffusion of innovation theory (1983, 2003). This theory focuses on understanding how, why, and at what rate innovative technologies spread in social systems (Rogers, 1962). Instead of focusing on persuading individuals to change, diffusion of innovation theory sees change as primarily concerning the evolution of products and behaviors, so they become a better fit for the needs of individuals and groups, reflecting the infrastructural level of technology adoption (Robinson, 2009). Diffusion is the process by which an innovation is communicated through various channels over time among members of a social system (Rogers, 2003).

The innovation decision process runs from the first knowledge about an innovation to a decision's full implementation and confirmation (Rogers, 1983). For diffusion to occur, Rogers (1983) maintained that an innovation—"an idea, practice or object that is perceived as new by an individual or other unit of adoption"—must exist to be diffused. What makes diffusion different from any other type of spreading is the "newness" of the innovation. A population of potential adopters must also exist for the innovation and there must be a communication flow between the innovation's developers and potential adopters (Rogers, 2003). Diffusion is not an automatic consequence of innovation, and the ease of innovation diffusion depends on different factors (Lapsley & Wright, 2004). Rogers (2003) described the innovation-diffusion process as "an uncertainty reduction process" (Rogers, 2003, p. 232).

The literature has argued that diffusion of innovation theory, in its pure form, inadequately explains the adoption of innovation in society because it is affected by technological, social, and learning "conditions" (MacVaugh & Schiavone, 2010) in the contextual domain of a community. Lyytinen and Damsgaard (2001) found that an innovation does not necessarily need to pass through various stages of adoption, since adoptions may take place in dyadic relationships, making it difficult to identify the stages of adoption. Anokhin and Schulze (2008) provided empirical evidence indicating that external factors (such as corruption) may negatively affect innovation diffusion and reduce the chances of adopters pursuing or accepting innovative ideas. Also, diffusion of innovation theory has been combined with other theories (Davis, 1985) to better explain the development of particular technologies or to account for the influences of external environments (El-Helaly et al., 2020).

Explorations of external environments that make diffusion of innovation theory more applicable to different types of innovations are nascent (Wani & Ali, 2015). MacVaugh and Schiavone (2010) have called for further investigation of external conditions and domains that complement diffusion of innovation theory, which will help in understanding the processes by which new technology is adopted. Building on this emerging line of research, we suggest that diffusion of innovation theory (Rogers, 1962) would benefit from a more systematic acknowledgement of social norm development within society and norm lifecycles within institutions (Bebbington et al., 2012; Brunnee & Toope, 1997; Finnemore & Sikkink, 1998; Morton, 2019; Sunstein, 1996). A better understanding of such boundary conditions—norms—could extend diffusion of innovation theory, making it more context-sensitive.

Norms become defined through standards of behavior that develop over time. They are built upon social attitudes about what ought and ought not to be, resulting in collective outcomes within institutional settings (Krasner, 1982; Sunstein, 1996), reflecting interactions between participants toward an "increasingly fixed pattern of expectations about appropriate behavior" (Brunnee & Toope, 2000, p. 21) that require collective action (Sunstein, 1996).

Critically, norms relate to *individual* standards of behavior rather than institutions as a *whole* (Finnemore & Sikkink, 1998). Institutions more aptly reflect the "collection of such practices and rules," and the particular mix of practices and rules varies over time (Finnemore & Sikkink, 1998; Morton, 2019, p. 563). This is important in a contemporary (digital) society:

> Institutions are not immutable, though they are often persistent (or resistant to change). They can be reshaped through changes in the constructed identities of the actors, identities that are in turn shaped and reshaped by action within the structures. This is what Giddens refers to as the "duality of structure": structures constrain social action, but they also enable action, and in turn are affected and potentially altered by the friction of social action against the parameters of the structure (Brunnee and Toope, 2000, p. 30).

It is therefore vital to appreciate that blockchains may develop differently across different "pockets" of or within institutions, at different time points (Brunnee & Toope, 2000; Sunstein, 1996). As a result of such shifts in behaviors, institutions will in turn be shaped, either by the adoption (or rejection) of new technologies such as blockchains, which may create efficiencies in current practice (be sustaining) and/or go further and establish new practices (be disruptive; Carlin, 2019; Kend & Nguyen, 2020).

Conformity in practice is generally established through increasing violations and disruptions of a preexisting norm(s) until the old norm is displaced and a new norm replaces it (Lessig, 1996). Hence, rather than perceiving developments in the financial reporting space as objective and dichotomous, through norm lifecycles we consider accepted practices to be transitory (Morton, 2019); that is, a norm progresses through a lifecycle of three stages (emergence, cascade, and internalization) before it becomes established and taken for granted (Finnemore & Sikkink, 1998; Morton, 2019; Sunstein, 1996).

10.3.1 The Innovation Adoption Process: Diffusion of innovations within a norm lifecycle framework

Rogers (1983) defined an innovation adoption process of five steps that we contextualized according to the adoption of norms in society (Bebbington et al., 2012; Brunnee & Toope, 1997; Finnemore & Sikkink, 1998; Morton, 2019; Sunstein, 1996; see Figure 10.1).

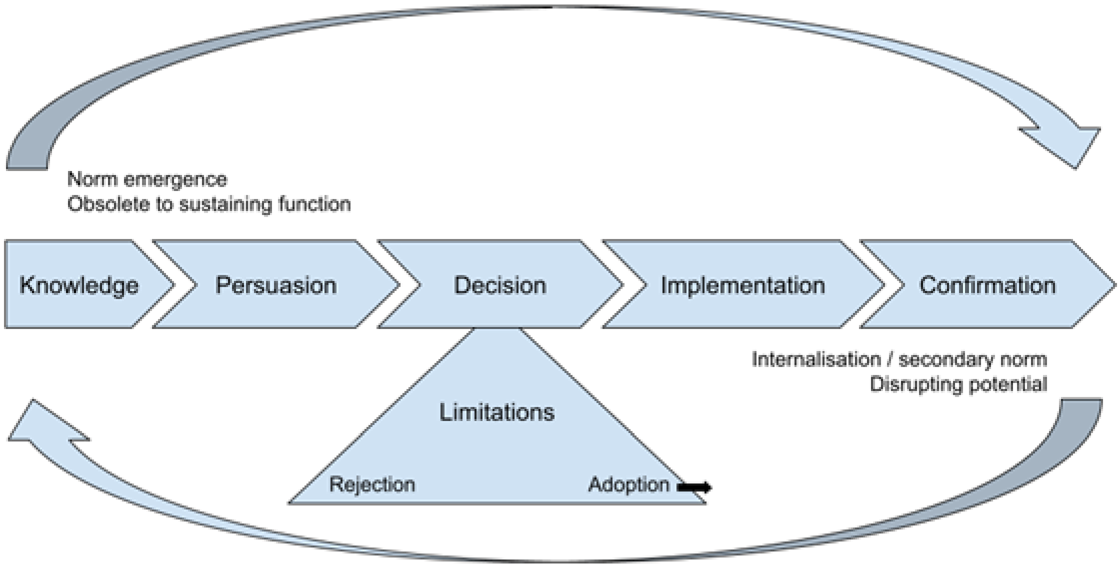

Figure 10.1 Synergies between theories

Source: Developed from Rogers (1983, p. 165) and Morton (2019, p. 566)

The *knowledge stage* of innovation diffusion theory is the stage at which individuals find out about an innovation through a variety of communication channels and acquire knowledge about it. During this stage, people try to determine "what the innovation is and how and why it works" (Rogers, 2003) and come to understand the main principles of how and why it works (Rogers, 2003).

This stage is followed by the *persuasion stage*. This occurs when an individual forms a favorable or unfavorable attitude toward an innovation (Rogers, 1983). The attitude is formed after a person perceives the existence of an innovation and gains a sufficient level of knowledge about it. At this stage, the uncertainty surrounding the use of the innovation may increase (or decrease) because of information received from the public. The internal and external networks through which potential adopters learn about innovations are crucial during this stage (Lapsley & Wright, 2004).

By linking diffusion of innovation theory with norm lifecycle theory, we propose that the first two stages outlined above are characteristic of the *norm emergence* stage of the norm lifecycle. During this stage, norm entrepreneurs attempt to change preexisting norms in society by convincing norm leaders to embrace a new norm (Finnemore & Sikkink, 1998; Morton, 2019; Sunstein, 1996). Norm entrepreneurs aim to highlight a problem that needs fixing, make use of dissatisfaction, and present a solution (Sunstein, 1996).

This stage reflects what ought to be. Finnemore and Sikkink (1998) highlighted that norm entrepreneurs seek to draw attention to a problem; dramatize it; and foster values, altruism, and empathy regarding the issue. Importantly, not even common knowledge is static, and this is something that should be appreciated (Franck, 1990). The reception of new ideas at this stage is not always well received (Morton, 2019); hence, this is a complicated stage of the norm lifecycle during which increasing interactions and patterns of behavior develop in unique ways (Djelic & Quack, 2008).

The *decision stage* of diffusion of innovation theory relates to the point in time at which a choice (adoption or rejection) regarding an innovation arises. The choice to adopt means making "full use of an innovation as the best course of action available," while the choice to reject means simply deciding "not to adopt an innovation" (Rogers, 2003). If adoption is chosen, the *implementation stage* follows, whereby the innovation is put into practice. The implementation of an innovation may result in behavioral changes (Rogers, 1983); for example, introducing a new technology may require adopters to learn new skills and change their behaviors (Rogers, 2003). Moreover, their attitudes toward the adoption of a new technology are shaped by mapping the benefits and costs associated with the technology (Bunduchi et al., 2011). This can be a difficult stage, since the innovation may be perceived as unfamiliar and this uncertainty may hamper further adaptation. Cooperation with people who have technical skills may help to decrease such uncertainty and speed up implementation. According to Rogers (2003, p. 180), "the innovation loses its distinctive quality as the separate identity of the new idea disappears."

We propose that these two stages reflect a important process within the norm lifecycle stage of *norm cascading*: as small shifts turn into bigger shifts in meaning and understanding, a norm bandwagon develops (Sunstein, 1996). The *tipping point* toward a norm cascade occurs when a threshold number—a critical mass—of adopters is reached (Finnemore & Sikkink, 1998). This tipping point initiates a cascade of adoption, involving a shift in dynamics, including a reduction in pressure, and those previously opposed to the innovation start to follow suit (Finnemore & Sikkink, 1998). As Morton (2019, p. 567) articulated, "it is a combination of pressures—conformity, desire for legitimacy or even the enhancement of esteem—that leads norm leaders to seek out new norm followers." Finnemore and Sikkink (1998) stated that there is no true quantitative threshold at which this tipping point is reached, given the social and dynamic nature of norm entrepreneurs and norm adopters; however, they indicated a one-third proportion as the minimum level of adoption required. Norm development may, however, fail: the obsolescence of norms is equally important and relevant to institutional practices (Legro, 1997). When norms take hold, questions can arise regarding their effectiveness (Legro, 1997).

The *confirmation stage* of diffusion of innovation theory follows the implementation stage and may reverse the decision made (Rogers, 1983). When a decision about implementation is made, people may seek information about the innovation. If a person is "exposed to conflicting messages about the innovation" (Rogers, 2003, p. 189), the implementation decision may be changed; therefore, the attitude of an individual toward the innovation, formed at the persuasion stage, plays a substantial role in whether the individual continues with the adoption of the innovation.

We propose that when a decision to implement an innovation is confirmed, *norm internalization* takes place, since legitimization occurs when norm has cascading, compliance, and conformity become automatic (Finnemore & Sikkink, 1998) and the norm becomes entrenched (Sunstein, 1996). At this stage in the lifecycle, discussion or debate is no longer the focus (Morton, 2019):

> Within the final stage of the life cycle—internalization—conformance becomes almost automatic, norm behavior is not questioned, and conformance is no longer discussed; therefore, it is no longer the center of debate and often ignored. Norms, once internalized, can be extremely powerful due to this lack of questioning—the norm is taken for granted, accepted practice, no longer a novelty. Here, rules, norms, beliefs, values, and choices are constrained by such social conventions, or if not, at least made partially "captive" by them, where accounting actors seeking approval become "creatures" of habit and tradition and susceptible to influence (Morton, 2019, pp. 567–568, citations omitted).

For example, for inter-period tax allocation, the debate may concern which method of deferring taxes should apply rather than whether deferred taxes should apply (Morton, 2019).

Regarding the contrast between innovations with sustaining or disruptive potential, once internalized, a norm can become binding and, critically, the lifecycle can repeat, with new norms emerging (Djelic & Quack, 2008; Finnemore & Sikkink, 1998). This can explain the apparent disconnect between normative theory and practice (Morton, 2019).

In summary, according to Rogers (1962), an innovation requires time from the date it becomes available to the point at which it is widely adopted. Similarly, although blockchain was first mentioned by Nakamoto (2008) as a means of payment, over time it has been implemented in different industries, as indicated in Section 2 of this chapter.

Blockchain technology may have a disruptive or sustaining influence on the accounting domain (Christensen et al., 2015); therefore, it was important for us to investigate the diffusion of blockchain adoption in accounting to understand which factors influenced decisions about adopting this specific type of innovation.

10.4 DIFFUSION OF BLOCKCHAIN TECHNOLOGY & THE INNOVATION ADOPTION LANDSCAPE

10.4.1 Norm emergence through knowledge and persuasion regarding blockchain technology

The first two stages of the innovation diffusion process (knowledge and persuasion), as outlined in Section 10.3, are characteristic of the process of norm emergence. Due to the lack of broad adoption of blockchains for financial reporting functions, blockchain technology is not yet legitimized as a norm within the profession and understanding of what it is and why it works is at an early stage (Rogers, 2003). We identified "norm entrepreneurs" as those seeking to offer solutions with trust and efficiency—a problem highlighted as something the profession ought to be concerned with, despite contemporary technologies such as the cloud and artificial intelligence (AI) having profound impacts on the accounting profession (Hatch, 2021). Schmitz and Leoni (2019) summarized academic and professional discussions relevant to the accounting and auditing field between 2008 and 2018. Across 16 academic and 20 professional sources, four themes emerged: (1) governance, transparency, and trust; (2) continuous auditing; (3) smart contracts; and (4) the role of auditors (Schmitz & Leoni, 2019). Based on Schmitz and Leoni's (2019) analysis, we concluded that norms - particularly knowledge dissemination - for accounting and auditing began to emerge in 2015. The first reports on blockchains by the professional community appeared only in 2015–2016 and it took several more years for the first research papers investigating the role of blockchains in accounting and auditing to be published in academic journals.

The relevant narrative for accounting reporting functions concerns the enhanced validation of entries: by keeping of separate records based on transaction receipts, companies can write their transactions directly to a joint register, creating an interlocking system of enduring accounting records (Cai, 2021; Cai et al., 2019; Cong & He, 2019; Yermack, 2017). The narrative presents blockchain technology as a means of ensuring that all entries are distributed and cryptographically sealed, so falsifying or destroying them to conceal illicit activities is virtually impossible.

To explain the notion of blockchain-based accounting, some researchers have used the term *triple-entry accounting*—which refers to accounting entries of involved parties being cryptographically sealed by a blockchain (Cai, 2021; Grigg, 2005; Moll & Yigitbasioglu, 2019). The notion of triple-entry accounting was first described in 2005 by Ian Grigg, three years before blockchain was invented (Grigg, 2005). Grigg described the possibility of using cryptographically protected digital receipts to verify transactions between different parties, storing them with a third party, and showing whether any details in the records were changed or deleted. Since a blockchain is immutable to any data amendment, it is almost impossible to falsify or delete written accounting entries (at least without substantial collusion; Malekan, 2018). However, the idea that blockchain is a "triple-entry" bookkeeping system is flawed (Dutta, 2020).

The premise follows that with the advent of blockchain, processes can become cheap, automated, and more reliable as the need for a third party to hold receipts in a centralized manner is superseded by a decentralized ledger (Lazanis, 2015). Lazanis (2015) was the first to coherently describe the possibility of conventional companies using blockchain accounting. He emphasized that blockchains eliminate the need for trust in an intermediary, such as a bank or insurance company, if companies voluntarily publish their transactions on a blockchain. This would benefit companies in many ways, including standardization allowing auditors to verify large portions of the most important data underpinning financial statements, automatically reducing both the cost and time necessary to conduct an audit, which would free auditors to add value to complex transactions or to focus on internal control mechanisms (Dai & Vasarhelyi, 2017; Zhang et al., 2017).

The ability to gradually integrate blockchain technology with typical accounting procedures, starting from securing the integrity of records to implementing completely traceable and fully automated audits (Rozario & Vasarhelyi, 2018), is particularly relevant to its diffusion within the profession and therefore within reporting functions. Potekhina and Riumkin (2017) presented a real-time blockchain accounting system (RBAS)—a software solution that enables currency, financial derivative, and other digital document transactions between two or more counterparts; stores transaction data in cryptographically protected blocks whose integrity is verified through mining; and allows the composition of financial statements at any time. In some instances, early-adopting companies implement blockchains into their enterprise resource planning (ERP) systems, such as for procurement and supplier management (Wang & Kogan, 2018). However, such uses do not reflect the open public permissionless blockchains that yield the core benefits mentioned. Instead, solutions are likely to be hybrid, permissioned versions that retain some of the shortcomings of other contemporary technologies (e.g., central authority, restricted scope of validation, and restricted transparency). For companies and their stakeholders to realize all the benefits provided by the technology, it is necessary that an RBAS comprises the following elements:

- Accessibility—the data must be easily accessible to a broad range of stakeholders.
- Immutability—there must be no programming opportunity to change data once they are entered, and to ensure this, the company using the system must not have the mining power.
- Transparency—transactions must be visible in real time, as is the case with Bitcoin.

Within this persuasion narrative, the value of trustless, intermediary-free solutions is evident, and the ongoing debate over blockchain technology's merits continues. This reflects the norm emergence stage at which the status quo is put under the spotlight. There is an increasing level of awareness, despite mixed understandings, yet nothing has changed substantially across institutions.

Blockchain technology can streamline information exchanges between organizations and foster trust between them (ACCA, 2017). However, as Schmitz and Leoni (2019) noted, perspectives across the accounting and auditing profession are diverse: "Overall, we have found that the perspectives of researchers and practitioners appear to be diverse, and neither group seems to be explicitly favourable or unfavourable towards blockchain development" (p. 338).

Researchers and practitioners are unconvinced about blockchains and critical of whether or how they will be influential and disruptive (Kend & Nguyen, 2020; Karajovic et al., 2019); for example, Fuller and Markelevich (2020) concluded that "it is hard to imagine accountants embracing blockchain in the absence of compelling arguments for the efficiencies it would bring" (p. 43). Furthermore, Kend and Nguyen (2020) concluded that we need to rethink the impact of blockchain technology, or at least engage in further debate. These concerns and suggestions are characteristic of the early diffusion stage at which blockchain technology is presently situated.

Although the benefits of blockchains are clearly articulated, their reception is complicated, and the profession has not yet been persuaded by the advocates of blockchain technology. This is particularly the case given that contemporary technologies are becoming more established (particularly big data, AI, and the cloud) in shaping the work of accountants (Moll & Yigitbasioglu, 2019). Kend and Nguyen (2020) found substantially more agreement about and legitimization of other technologies (e.g., robotics process automation, big data analytics, and AI) shaping institutions and behaviors, indicating that blockchain technology for the accounting profession remains in the earliest stages of its lifecycle.

10.4.2 Barriers to Norm Cascading and Decision-Making for Blockchain Technology Adoption

In theory, blockchains could fail to leave the emergence stage within a particular community. As noted in Section 3, completing the norm lifecycle is not inevitable (Finnemore & Sikkink, 1998; Morton, 2019). Norms may become obsolete (Legro, 1997), and from the perspective of innovation diffusion, adoption of an innovation may be rejected due to uncertainty about the outcome (Rogers, 2003), mirrored by the doubts surrounding blockchains. We identified two key limitations of blockchain technology that have the potential to create barriers to reaching a tipping point for cascading: (1) a *limitation of scope*, in that blockchain operates at the transactional level, and (2) a *limitation of discretion*, in that blockchain technology is fundamentally limited in its ability to cater to the discretion required by accounting standards and therefore in its ability to comply with financial reporting obligations.

10.4.3 Limitation of scope: Blockchains shift activity at the transactional level

Accounting is a technical, social, and moral practice concerned with the sustainable utilisation of resources and proper accountability to stakeholders to enable the flourishing of organisations, people and nature (Carnegie et al., 2021, p. 69).

The narrative of persuasion presents compelling arguments that blockchains replace trust in intermediaries; for example, traceability of accounting policies reflected in smart contracts has increased transparency and the comparability of accounting information (Yu et al., 2018), particularly given that blockchain technology connects disclosures between companies (Watson & Mishler, 2017). However, the scope of this evolution lies in the hands of the direct participants involved in transactions. For financial reporting functions, accountants, auditors, and tax practitioners are outside this participation, and their roles involve turning transaction inputs into meaningful outputs. Hence, we distinguished between the transaction level and the reporting level. Despite Dutta (2020) dismissing the "triple entry" terminology with respect to blockchains, the technology is linked to bookkeeping functions. The influence of blockchains on accounting is currently focused on the transaction level, rather than the reporting level, for the standardization and automation of accounting services such as data collection, record checking, and bookkeeping (ACCA, 2017). Blockchains provide a verified and trusted foundation for inputs at the transaction level (Dai & Vasarhelyi, 2017).

Accounting is impactful because of what it does with basic transaction inputs, since two firms can make different financial reporting choices for similar transactions (Hodge et al., 2004) that will have enormous differences for users of financial information and not necessarily solve the problem of information asymmetry. Transparency at the transaction level is problematic (Lander & Auger, 2008) from the perspective of providing information to users of financial information because much of the information is disorganized, uninformative, and arguably meaningless. Moreover, the definition of "transaction" is somewhat problematic, as Dutta (2020) noted:

> The term "transaction" in blockchain nomenclature is over-generalized than its meaning and usage in traditional accounting and business vocabulary. In business education, we define a transaction as a business event with an unrelated third party having a monetary consequence. In accounting terminology, transaction is even more precisely and narrowly defined as

> having an impact on the financial statements, and thereby subject to meeting certain criteria promulgated by the accounting bodies, like the FASB or IFRS (Dutta, 2020, p. 26).

Overall, Dutta (2020) concluded that only a fraction of blockchain transactions would "qualify" as accounting transactions.

Long-established accounting principles hold (or at least presume) that meaning is gained through the application of accounting principles and standards (Clarke et al., 2003). Accounting processes turn uninformative raw data into meaningful aggregated information that is useful for decision-making. Critically, regulatory frameworks usually take account of discretion. Moreover, more contemporary definitions of accounting go beyond basic technical practice to consider the social and moral dimensions of accounting (Adams, 2004; Carnegie et al., 2021). Carnegie et al. (2021) noted:

> Morality and accounting are interconnected. Indeed, a social practice cannot be separated from morality since a social practice affects others and is based on human interaction that creates obligations and duties. Morality is at accounting's core. Acting ethically, and in the public interest, on all occasions and in all contexts is expected of all professional accountants according to the IESBA (2018) International Code of Ethics for Professional Accountants. Accounting constructs realities which in turn dictate the conditions of human life (p. 68).

Raw transactions, verification, and transparency have not yet reached an appropriate level to support accountability in the sense of external disclosures, whether mandatory or voluntary. Stakeholders need meaningful (timely and useful) information before conducting transactions. In theory, even if a customer or stakeholder has raw (verified and trusted) blockchain data, it may not be useful for decision-making. Meaningful information is created out of raw data via accountability—once transactions occur, organizations interpret them through accounting processes and assign meaning before making disclosures via general and specific-purpose financial statements.

O'Leary (2018, p. 149) highlighted that entities may use blockchain technology for some of their transactional activities across supply chains, enabling them to "just do peer-to-peer or consortium blockchain to provide information to a range of interested parties, whether that information is correct or not"; for example, some issues related to the reporting of property, plant, and equipment (PPE) can be embedded in smart contracts whereas others cannot. The rule-based accounting principles relating to PPE, such as classifying PPE as an asset, defining its initial cost, calculating depreciation expenses based on the length of useful life, and maintenance provisions can be accounted for in ledgers. However, when a revaluation principle of PPE is used, principle-based accounting comes into play, involving the need for an accountant's professional judgment, which is more challenging to embed in blockchains. When a judgment is executed, further technical revaluation procedures can nevertheless be followed up with the help of blockchain smart contracts. Reflecting on O'Leary (2018, p. 149), entities should retain separate internal accounting information systems "where they do their 'real' accounting and supply chain management." In this way, blockchain technology can improve the efficiency of financial reporting functions (having a sustaining impact) through collaboration, rather than completely disrupting the accounting role.

Rozario and Vasarhelyi (2018) presented a holistic audit model that encompassed blockchain and off-blockchain procedures. Simply put, blockchains support the credibility and efficiency of recorded transactions, but they do not solve the issues of categorization, valuation, correct asset disposal, and clear communication with stakeholders (ACCA, 2017; Free & Hecimovic, 2021). Concerns relate also to records uploaded to blockchains reflecting real-world activities (Kokina et al., 2017); for example, Schmitz and Leoni (2019, pp. 335–336) stated that the recognition of an asset on a blockchain "does not guarantee that the asset has been transferred or exchanged, payments have been made and transactions have been recorded in the real world." A similar concern was raised regarding the introduction of double-entry bookkeeping:

> "… For every debit there *must* be a credit, and for every credit there *must* be a debit" - Alas! How few consider, that if this *must* be the case,---this the rule to go by, nothing is more easy than to make a set of Books wear the appearance of correctness, which at the same time is *full of errors*, or of *false entries*, made on purpose to deceive! (Jones, 1796, p. 17).

Regarding the scope of blockchain technology, Dai and Vasarhelyi (2017) pointed out that blockchain technology could support a new "accounting ecosystem" (p. 6) by protecting data integrity and facilitating real-time information sharing, together with the automation of process controls. Similar descriptions were echoed by the ACCA when it stated that "the entire concept of this [blockchain] technology rests on transforming an eco-system, rather than just an individual organisation," and increasing the level of connectedness within society (ACCA, 2017). As blockchain technology continues to develop, many facets of the business ecosystem can be supported by interoperable tech stacking and multichain solutions. As data is distributed in new digitally enhanced ways (e.g., via blockchain layering and tech stacks), this will require a shift in professional roles:

> While some insinuate that blockchain will replace the accounting profession, it hardly seems so. Quite to the contrary, blockchain might actually make certain accounting skills and knowledge more relevant. While blockchain surely would have an effect on some accounting procedures and processes, it will also create the need for new skill-sets to be developed within the context of accounting and business (Dutta, 2020, p. 28).

Dutta (2020) highlighted the task of "culling" blockchain transactions, which requires a sound understanding of accounting standards. Despite an appropriate focus on supply chains and internal efficiencies, external users are part of the ecosystem. Investors and broader stakeholders rely on general purpose financial statements (GPFSs), while more specific stakeholders have the power to request special-purpose financial statements (SPFSs). Reporting functions that use accounting information are a critical part of the ecosystem; however, the regulatory framework that drives reporting functions creates a further critical juncture. Blockchain technology may improve transparency by providing shareholders and stakeholders with immediate access to accounting data at the transactional level, while simultaneously providing an opportunity to create differentiated access to information for stakeholders and shareholders with different demands for information (Schmitz & Leoni, 2019). This increased transparency, combined with the verifiable nature of blockchain technology, may enhance stakeholders' trust; however, it does not necessarily meet the requirements of financial reporting in terms of understandability and meaningfulness. We now consider the limitation of discretion, which we believe is imperative for turning data into meaningful informational outputs.

10.4.4 Limitation of discretion: Blockchain lacks capability for discretion in accounting standards

The second limitation relates to the discretion allowed within accounting practice and to the limitation of scope outlined above. Discretion based on professional judgment becomes more pronounced with a shift away from traditional physical assets (such as plant and equipment) toward an increasing focus on intangible assets (such as brand or intellectual property; Lev, 2019). The profession's conceptual frameworks encompassing judgment and choice to allow fair representations are perceived as normal, legitimate practices (Hines, 1991).

As Schmitz and Leoni (2019) highlighted, firms, regulators, and standard setters are already aware of the impact blockchain technology may have on the accounting and auditing profession (e.g., Deloitte, 2016). The ICAEW (2017) reflects that blockchain technology enables cost-saving without the need to reconcile a ledger, thus streamlining the accounting process and leading to improved confidence. However, as O'Leary (2018) stated, this may not be quite as simple as recognizing the principle-based approach taken by the profession. Complexity with respect to regulation and discretion within accounting standards results in substantive limitations on the capabilities of blockchains (in particular smart contracts) and their fitness for purpose; for example, take the words of Miller and Power (2013) regarding accounting's role:

> [P]ay attention to the mutually constitutive nature of accounting, organizing, and economizing. This means viewing accounting as much more than an instrumental and purely technical activity. We identify four key roles of accounting: first, *territorializing*, the recursive construction of the calculable spaces that actors inhabit within organizations and society; second, *mediating*, that much of what accounting instruments and ideas do is to link up distinct actors, aspiration, and arenas; third, *adjudicating*, that accounting plays a decisive role in evaluating the performance of individuals and organizations, and also in determining failings and failures; and fourth, that accounting is a *subjectivizing* practice par excellence, that it both subjects individuals to control or regulation by another, while entailing the presumption of an individual free to choose. The entanglement of these four roles, we suggest, is what gives the "accounting complex" its productive force, such that it is perhaps the most powerful system of representation for social and economic life today in many national settings (p. 557).

To achieve this, a principle-based approach to financial reporting must be adopted rather than the rule-based approach, which has a long history (Gordon, 1964). Regarding accounting standards, it is difficult to be consistent and comprehensive within a dynamic social system (Boland, 1982). Moreover, conformity with generally accepted practices is long habituated and rationalized, making it difficult to shift (Boland, 1982; Morgan, 1988; Oliver, 1997). The profession grapples with increasing complexities and shifting practices, leading to arguably redundant practices (Hopwood, 2007); for example, the idea of smart contracts enabling executable instructions based on a set of specific rules challenges the presumption of whether there is a single version of truth (or untruth) as opposed to the preferred notion of faithful representation (compare Bayou et al. [2011] with Collett [1995] on the issues of truth and fair representation). Gerboth (1972) saw it as naive to consider accounting as seeking a single truth, while Pollock (2008) regarded truth as never being simply about facts. Transactions may be recorded in an immutable form based on a set of executable conditions; however, they may evolve into a particular outcome through a process outside mathematical or logical proofs. West (2003), for example, raised concerns over the mixing of concrete and abstract facts and expectations within accounting practice (Chambers, 1968). These arguments show that, although accounting numbers appear to be objective, this is merely superficial (Hines, 1988; Moore, 2009; Morgan, 1988).

As Chambers (1991) noted, there may be many financial statement "versions" that meet the requirements for financial reporting due to the element of choice allowed within the system. Smart contracts may help digitally verify, control, and enforce transactions, and with the help of consensus protocols, lead to agreement about the sequence of actions specified in a contract (Schmitz & Leoni, 2019). Presently, smart contracts can be utilized to facilitate the terms of contracts for transactions between parties (e.g., Kim & Laskowski, 2018). However, this is still at the transaction level rather than the level at which information is aggregated with the application of necessary accounting policies.

The principles of inter-period taxation have similarly developed over a long period of time, transitioning from novelty to taken-for-granted (Morton, 2019). The normative theory of why these principles ought to apply dates to the early 1940s: incorporating principles of deferred taxation "corrects" the problems of unreal fluctuations in reported income tax (American Institute of Accountants, 1944). However, contention continued for decades and involved numerous elements, such as the classification of income tax (was it, for example, an expense, an appropriation of profit, or a redistribution of wealth?) and the appropriate interpretation of accrual mechanisms (Morton, 2019). As Chambers (1996, p. 21) explained, deferred taxes "may never happen," yet "such imaginations" are recorded. Others have described deferred taxes as "a strange twilight world" (West, 2003). Deferred taxes arguably represent expenses that are yet to occur, depending on future events (such as a tax assessment based on taxable income or dynamic tax rates; Rosenfield & Dent, 1983), and their complexity depends on tax profiles (e.g., for multinational companies, capital investments, available losses, or double tax agreements; ASB, 1995).

However, despite these concerns, inter-period tax allocation became an established practice within the accounting profession, and concern moved to *which* method to apply (Morton, 2019). Consequently, the accepted principles underpinning income tax reporting are highly complex and rest on income tax laws that are dynamic and subject to frequent change. The latter is a limitation for blockchains with respect to tax law (DISER, 2020; Morton & Curran, 2021). Not only are there issues for blockchains operating at the transaction level and concerns about alignment with accounting concepts, but there are also gaps in what blockchain records—such as those for income tax—require in terms of judgments within complex settings. There are substantial difficulties in contemplating the principles underpinning the conversion of inter-period tax allocations into executable smart contracts without fundamental shifts in the approach to reporting income taxes, as well as a consideration of the complexity and dynamic nature of tax laws across numerous jurisdictions (the latter considered by Morton and Curran, 2021). Hence, it is critical to appreciate the network of regulatory frameworks (both within and beyond generally accepted accounting principles (GAAP)) that apply.

Regarding deferred taxes, trust is essential in the accounting profession. Gill (2011) highlighted that it is not trust in the numbers, but trust in the accountants, that matters. Prior to the emergence of blockchain technology (and perhaps other contemporary technologies impacting the profession), trust in accountants was unavoidable, despite caution over deviant or undesirable behavior (Gill, 2011). Following rules blindly can lead to failures within the system, in what Gill (2011) described as the reduction of "the ethical to the technical." When an accountant presents information in a truthful way, Morgan (1988) claims the following:

> In actual practice, many people know that the accountant's work is based on somewhat arbitrary assumptions and conventions. They know that the accountant is really in the business of trying to persuade others that his or her concepts, or latest set of figures, "give a true and fair view" or have superior insight, when in reality this view, whatever the figures might say, is as partial as any other. The accountant's view of reality often carries more weight than other views, because of the power relations associated with the allocation

> and control of scarce resources. But this should in no way be seen as due to the accountant's "objectivity" (Morgan, 1988, p. 482).

Trust is what blockchains offer: the ability to reduce reliance on those parties (intermediaries) with authority and expertise and to foster trust in the (blockchain) code. Schmitz and Leoni (2019, pp. 337–338) doubted that blockchains could fully replace accounting knowledge that is capable of "prevent[ing] asset misappropriation, erroneous measurement or estimation of valid transaction[s]." In line with this argument, we argue that the incredible complexity of the accounting regulatory framework, giving substantial room for managerial judgment and discretion, constitutes a fundamental limitation on blockchain technology completely taking over the accounting function—at least without a fundamental overhaul of the regulatory and reporting framework (i.e., a shift toward a strict rule-based approach). Such an overhaul would certainly disrupt financial reporting; however, it would also raise issues regarding the rigidity and interaction of fundamental safeguards such as those found in commercial law, as well as concerns over managerial costs arising from unforeseen automated decisions (Tse, 2020).

This would be much more difficult to achieve than innovations that are more sustaining in nature (i.e., improving efficiencies across existing systems and structures); for example, increasing the quality of accounting inputs or achieving the ASX replacement of the CHESS function outlined in Section 2. Morton and Curran (2021) similarly raised the issue of discretion for the tax regulatory environment. Unless the legislation has clear black and white formulae (but even then), tax law is dynamic, and the authors concluded that digitalization and simplification of tax law are required for the digital economy to thrive.

As indicated in Section 10.4.2, it is still presumed that what is recorded on blockchains *matches* the real world (Schmitz & Leoni, 2019; Yu et al., 2018). The problems of fraudulent, illegal, unauthorized, and counterfeiting activities, or other vulnerabilities, remain (Dutta, 2020; Schmitz & Leoni, 2019; Yu et al., 2019). Note, however, that blockchain technology's ability to facilitate tech stacking, such as by including oracles, can be adapted to resolve onboarding issues with respect to other use cases (Cho et al., 2019).

EY Global (2017) raised the question of what impact blockchain technology might have on regulatory frameworks and advocated early involvement by regulators and central banks to ensure that innovations develop in harmony with existing legal frameworks. PwC similarly highlighted the importance of considering the supporting systems and governance of disruptive technologies (PwC, 2016). The ICAEW (2017) pointed out that crafting regulations and standards to implement blockchains is not easy and can take many years. The organization noted that only with the professional guidance and expertise of leading accountancy firms and bodies can these challenges be met, by embedding innovations to revitalize the future of practice (ICAEW, 2017). Given that contemporary technologies enable innovative practices and efficiencies, the resources required to establish complex (potentially parallel or multi-level) blockchains to resolve the limitations of smart contracts for discretionary regimes may be redundant (ACCA, 2017). The ACCA (2017) highlighted the work being done on establishing interoperability and standardization for distributed ledgers, such as creating solutions in which multiple parallel and independent blockchains connect and operate together and retain their security protocols. Relevantly, Dutta (2020) highlighted that blockchains are likely to lead to particular accounting skills and knowledge becoming *more* relevant, including the ability to determine which transactions are relevant and which ought to be *culled*.

The profession may accept this innovative technology, restricted in scope as an “oracle of truth” input into accounting functions, for improving the quality and credibility of raw transaction data as a form of a verified “truth” by using blockchain oracles for on-chain inputs (Cho et al., 2019). Although the profession may find it challenging to agree on truth (or usefulness) (Moore, 2009), blockchains may enable consensus on *a* truth.

10.4.5 Internalization of Norms and the Non-Redundant Role of Central Authorities for Blockchain Technology

> As the physical, digital, and biological worlds continue to converge, new technologies and platforms will increasingly enable citizens to engage with governments, voice their opinions, coordinate their efforts, and even circumvent the supervision of public authorities. Simultaneously, governments will gain new technological powers to increase their control over populations, based on pervasive surveillance systems and the ability to control digital infrastructure. On the whole, however, governments will increasingly face pressure to change their current approach to public engagement and policy making, as their central role of conducting policy diminishes owing to new sources of competition and the redistribution and

> decentralization of power that new technologies make possible (Schwab, 2016).

Considering the persuasive narrative for adopting blockchain technology and the move toward its implementation stage, we reflected upon balancing blockchains' facilitation of decentralized governance and a decentralized infrastructure with a continued role for central governance within the wider digital ecosystem. Given the two limitations outlined previously, we assert that for a highly regulated profession with a strong community of practice, central authority and governance will play a significant role in future developments. For blockchain technology to have an impact on the accounting profession, this duality will need to be acknowledged. With the ability of blockchains to play a decentralized infrastructure role, there is a continued need for central governance that is articulated as a new paradigm of "digital-era governance" (Andrews, 2019).

GAAP norms have become established over long periods of time through a normative process (i.e., GAAP norms are *internalized* and *binding*) (Morton, 2019). Irrespective of distributed technologies, GAAP is global and applied across jurisdictions by the International Financial Reporting Standards (IFRS). The profession has already achieved cooperation across jurisdictions, recognizing that variations are required for particular communities (e.g., Australian-equivalent IFRS [A-IFRS]). Tensions between the local and distributed are not new to the accounting profession (Ball, 2006).

Critically, we argue that statements such as "blockchain technology enables complete, conclusive verification without a trusted party" (Deloitte, 2016, p. 3), for the purposes of improving financial reporting functions, will continue to rely on centralized governance. This is fundamental, since we need to be able to trust the underlying technology and recognize that not all transactions will occur *on chain* (Kokina et al., 2017; Yermack, 2017). Also, new technologies raise new governance issues, such as cybersecurity, privacy, and regulatory protection. Concern has already been raised over miners' arbitrage activities, referred to as miner extractable value (MEV). Within community discussion circles, the Ethereum blockchain has been described as "highly adversarial":

> If a smart contract can be exploited for profit, it eventually will be. The frequency of new hacks indicates that some very smart people spend a lot of time examining contracts for vulnerabilities. But this unforgiving environment pales in comparison to the mempool (the set of pending,

unconfirmed transactions). If the chain itself is a battleground, the mempool is something worse: a dark forest (Robinson & Konstantopoulos, 2020).

There is a need to recognize technology as supporting the human element. As Morton and Curran (2021) noted, shifting trust may shift where incentives for undesirable activities lie. They concluded that irrespective of technology evolution, “holistic checks and balances” are needed as part of a “greater, holistic, digital ecosystem” that balances rights, equity, and fairness. Also, AML/CTF (and “know your client” (KYC]) issues will continue to cause concern among regulators (FATF, 2019).

If central governance is facilitated and the fundamental limitations of scope and discretion are overcome, blockchain technology may reach the tipping point and be diffused across a critical mass of adopters. If this occurs, we will be able to observe how it moves from the norm cascade to internalization. At this point, the technology will take hold and become a “taken-for-granted” aspect of financial reporting functions. However, we argue that blockchains may yet be disruptive. They do not impact the existing patterns and paradigms of the accounting and auditing professions (Kend & Nguyen, 2020); rather, they play a sustaining role, complementing the already developing digital ecosystem alongside big data, AI, and cloud technology (Brennan et al., 2019).

10.5 OBSOLETE, SUSTAINING, or DISRUPTING?

This chapter clarifies the stages of blockchain technology development within the context of financial reporting by merging two theories—diffusion of innovation theory and norm lifecycle theory. We argue that it is still unclear for the accounting profession and financial reporting functions whether blockchain technology will become established and normalized within the industry, or obsolete among a suite of other contemporary technologies.

We argue that blockchain acceptance within financial reporting functions is in its infancy; it is in the *norm emergence* stage of the norm lifecycle and just at the beginning of its diffusion process. Blockchains have the potential to diffuse (Rogers, 1962, 1983, 2003) through all stages of the lifecycle only *if* and *when* their presence is normalized. For blockchains to be fully implemented and become normalized, they need legitimacy *within accounting practice* (Morton, 2019), which, according to norm theory, arises through a bundle of broad-ranging social factors, beyond enforcement, that direct people toward voluntary acceptance (Franck, 1990).

We highlight that the difficulty of blockchains moving to a norm cascade and supporting the "decision" stage lies in two key limitations: (1) a *limitation of scope* and (2) a *limitation of discretion*. What is observable in this early stage is that blockchains are perceived as offering more sustaining opportunities (e.g., Cai, 2021; Carlin, 2019) or are considered a "foundational technology" with a slow but steady uptake (e.g., Iansiti & Lakhani, 2017, p. 4). The accounting profession may see the acceptance of blockchain technology as an "oracle of truth" input to accounting functions that may improve the quality and credibility of raw transaction data. Therefore, even though the profession may find it challenging to agree on truth (or usefulness) (Moore, 2009), blockchains may help in facilitating *consensus* on *a* truth.

Critically, however, if persuasion can be achieved and the tipping point reached, what we interpret as important factors in constituting a critical mass of adopters is a bundle of factors that go beyond blockchain technology's benefits. Even if blockchains offer the benefits of transparency, trust, and traceability of financial information, it may not be sufficient for them to be accepted and adopted. We have reflected on the social lens employed here and the role of social factors (Finnemore & Sikkink, 2001) and norm communities (e.g., Karlsson-Vinkhuyzen & Vihma, 2009) and institutions (e.g., Brunnee & Toope, 2000) within which the status quo is being questioned.

Blockchains can offer improvements in transparency, security, permanence, and immutability at the infrastructural level (O'Leary, 2018; Yu et al., 2018). However, the governance and oversight of centralized, cooperating organizations will remain necessary, whether in respect of decreasing financial information asymmetry (Yermack, 2017; Yu et al., 2018), enhancing company competitiveness (Deloitte, 2019), or building trust between market participants (Yu et al., 2018). In this way, blockchain as a decentralized technology playing an important role at the infrastructure level will be underpinned by coordinated central governance comparable to IASB monitoring and management of accounting standards across a multitude of jurisdictions. Therefore, it is not the decentralized infrastructure itself but its combination with a cooperative governance *central* to its operation that is likely to create opportunities for blockchain technology to diffuse across the accounting profession. As Morton and Curran (2021) noted, blockchain technology may contribute to a "technology toolkit."

We posit that blockchain technology will not yet be disruptive, since such technology adoption does not yet adequately impact the existing patterns and paradigms of the accounting and auditing professions (Kend & Nguyen, 2020); instead, such developments have a sustaining function (Carlin, 2019). Despite this, through a norm lifecycle lens, we argue that blockchains *could* have the potential to be *disruptive*. This requires an examination beyond the transactional level. This disruptive potential may arise in two ways.

First, we imagine that blockchain technology may disrupt reporting functions by shifting stakeholder needs, creating the potential for independent stakeholder-driven reporting. In doing so, in combination with the Internet of Things (IoT) and Industry 4.0, financial reporting could see a blurring (or radical overhauling) of general purpose and special purpose financial statements (GPFSs and SPFSs) and, moreover, the redundancy of users (in particular, suppliers being less reliant on GPFSs due to interlocking/shared ledgers) within this space. In such a digital ecosystem, blockchain technology offers a verified truth and, therefore, information provenance across business networks. The notion of general users reliant on GFRS could shift since parties would build confidence in the entity with which they do business. Smart contracts automate contract terms; therefore, enacting measures to resolve misalignments between agreements and outcomes will be necessary. However, this would be a new *secondary norm* emerging from blockchain adoption once (and if) it diffuses throughout the accounting profession.

This leads us to the second disruptive impact, which is indirect but interrelated. We considered the activity-based nature of blockchain technology and the digital ecosystem in which it operates. What is core to economic activity is the economic entity that reports on economic activity according to financial reporting principles. As outlined, blockchain technology offers a new form of digital economic structuring: the DAO. DAOs enable an unlimited number of participants to collectively govern economic activity: power, control, and decision-making revert from a central authority to a decentralized, non-hierarchical, protocol-based structure (Tse, 2020). The DAO structure therefore challenges the assumptions presented in Section 4.3 through a reorientation of the locus of disruption of financial reporting functions from an economic activity (which is generally the focus of accounting scholarship with respect to blockchain technology) to an economic entity.

This raises questions not only about the jurisdictional relevance but also about the fundamental shift in key stakeholders that GPFS represents. For reporting entities, it is likely that there will be a separation of ownership and management, creating agency and a need for monitoring and information dissemination, with reduced agency costs for DAOs (Tse, 2019). However, simultaneously, DAOs may raise new issues over algorithm-based managerial costs arising from unforeseen automated decisions (Tse, 2020). With accounting standards largely harmonized internationally (i.e., via the IFRS), the financial reporting framework may be ideally placed for DAO-based GAAP as jurisdictions introduce new legal structures to formally recognize DAOs.

10.6 CONCLUDING REMARKS

It is fitting to appreciate that blockchains may develop differently, across and within institutions, at different points in time (Brunnee & Toope, 2000; Sunstein, 1996). As a result of these shifts in behavior, institutions will in turn be shaped by the adoption (or rejection) of new technologies such as blockchains, which may create efficiencies in current practice (be sustaining) and/or go further to establish new practices (be disruptive; Carlin, 2019; Kend & Nguyen, 2020).

Reflecting on the words of Carnegie et al. (2021), the profession's contemplation of blockchain technology must encompass the interconnectedness of morality and accounting. After all, as they noted and we reiterate, the realities that accounting constructs "dictate the conditions of human life" (pp. 68). Although emerging and contemporary technologies are facilitating greater efficiencies, there is an increasing need to protect—or nurture—social and moral elements.

10.7 REFERENCES

ACCA (2017). *Divided we fall, distributed we stand: The professional accountant's guide to distributed ledgers and blockchain*. Retrieved from https://www.accaglobal.com/my/en/technical-activities/technical-resources-search/2017/april/divided-we-fall-distributed-we-stand.html. Accessed July 13, 2020.

AUSTRAC (2021) *AUSTRAC statement 2021: de-banking.* Media release. Retrieved from https://www.austrac.gov.au/news-and-media/media-release/austrac-statement-2021-de-banking. Accessed December 19, 2021.

Adams, C. A. (2004). The ethical, social and environmental reporting performance portrayal gap. *Accounting, Auditing & Accountability Journal*, 17(5), 731–757.

Allen, D. W., Berg, C., Davidson, S., Lane, A. M., and Potts, J. (2020). *Unfreeze: How to create a high growth economy after the pandemic*. American Institute for Economic Research.

American Institute of Accountants (1944). *Accounting research bulletin no. 23: Accounting for income taxes.* AIA.

Andrews, L. (2019). Public administration, public leadership and the construction of public value in the age of the algorithm and 'big data'. *Public Administration*, 97(2), 296–310.

Anokhin, S., & Schulze, W. S. (2009). Entrepreneurship, innovation, and corruption. *Journal of Business Venturing*, 24(5), 465–476.

Atzori, M. (2017). Blockchain technology and decentralized governance: Is the state still necessary? *Journal of Governance and Regulation*, 6(1), 45–62.

Ball, R. (2006). International financial reporting standards (IFRS): Pros and cons for investors. *Accounting and Business Research*, 36(Sup1), 5-27.

Bayou, M. E., Reinstein, A., & Williams, P. F. (2011). To tell the truth: A discussion of issues concerning truth and ethics in accounting. *Accounting, Organizations and Society*, 36(1), 109-124.

Bebbington, J., Kirk, E. A., & Larrinaga, C. (2012). The production of normativity: A comparison of reporting regimes in Spain and the UK. *Accounting, Organizations and Society*, 37(2), 78–94.

Bentley, D. (2019) Timeliness principles of taxation protection. *eJournal of Tax Research*, 16(3), 679.

Berg, C., Davidson, S., & Potts, J. (2019). Blockchain technology as economic infrastructure: Revisiting the electronic markets hypothesis. *Frontiers in Blockchain.* Retrieved from https://www.frontiersin.org/articles/10.3389/fbloc.2019.00022/full. Accessed December 19, 2021.

Boland, R. J. (1982). Myth and technology in the American accounting profession. *Journal of Management Studies,* 19(1), 107–127.

Brennan, N. M., Subramaniam, N., & van Staden, C. J. (2019). Corporate governance implications of disruptive technology: An overview. *The British Accounting Review*, 51(6), 100860.

Brunnee, J., & Toope, S. J. (1997). Environmental security and freshwater resources: Ecosystem regime building. *American Journal of International Law*, 91(1), 26–59.

Brunnee, J., & Toope, S. J. (2000). International law and constructivism: Elements of an interactional international theory of international law. *Columbia Journal of Transnational Law*, 39(19), 19–74.

Bunduchi, R., Weisshaar, C., & Smart, A. U. (2011). Mapping the benefits and costs associated with process innovation: The case of RFID adoption. *Technovation*, 31(9), 505–521.

Cai, C. W. (2021). Triple-entry accounting with blockchain: How far have we come? *Accounting and Finance*, 61(1), 71–93.

Cai, C. W., Linnenluecke, M. K., Marrone, M., & Singh, A. K. (2019). Machine learning and expert judgement: Analyzing emerging topics in accounting and finance research in the Asia–Pacific. *Abacus*, 55(4), 709–733.

Carlin, T. (2019). Blockchain and the journey beyond double entry. *Australian Accounting Review*, 29(2), 305–311.

Carnegie, G., Parker, L., & Tsahuridu, E. (2021). It's 2020: What is accounting today? *Australian Accounting Review*, 31(1), 65–73.

Casey, M. J., & Vigna, P. (2018). *The truth machine*. St Martin's Press.

Castonguay, J. J., & Stein Smith, S. (2020). Digital assets and blockchain: Hackable, fraudulent, or just misunderstood? *Accounting Perspectives*, 19(4), 363–387.

Chambers, R. J. (1968). Tax allocation and financial reporting. *Abacus*, 4(2), 99–123.

Chambers, R.J. (1991). *Foundations of Accounting*. Geelong, VIC, Australia, Deakin University Press.

Chambers, R. J. (1996). Floccinaucinihilipilification in Accounting - Does it Matter? *Australian Accounting Review*, 6(1), 16–22.

Chartered Accountants Australia and New Zealand (CA ANZ) (2017). *The future of blockchain*. Retrieved from https://www.charteredaccountantsanz.com/news-and-analysis/insights/research-and-insights/the-future-of-blockchain. Accessed June 23, 2021.

Cho, S., Vasarhelyi, M. A., & Zhang, C. (2019). The forthcoming data ecosystem for business measurement and assurance. *Journal of Emerging Technologies in Accounting*, 16(2), 1–21.

Christensen, C. M., Raynor, M. E., & McDonald, R. (2015). *What is disruptive innovation?* Retrieved from https://www.innosight.com/wp-content/uploads/2018/01/Innosight_HBR_What-is-Disruptive-Innovation.pdf. Accessed July 31, 2021.

Clarke, F., Dean, G., & Oliver, K. (2003). *Corporate collapse: Accounting, regulatory and ethical failure*. Cambridge University Press.

Collett, P. (1995). Standard setting and economic consequences: An ethical issue. *Abacus*, 31(1), 18–30.

Cong, L. W., and He, Z. (2019). Blockchain disruption and smart contracts. *The Review of Financial Studies*, 32(5), 1754-1797.

CPA Canada (2016). *Technological disruption of capital markets and reporting? An introduction to blockchain*. CPA Canada.

CPA Canada, AICPA, & UWCISA (2017). *Blockchain technology and its potential impact on the audit and assurance profession*. Retrieved from https://www.aicpa.org/content/dam/aicpa/interestareas/frc/assuranceadvisoryservices/downloadabledocuments/blockchain-technology-and-its-potential-impact-on-the-audit-and-assurance-profession.pdf. Accessed July 24, 2021.

Dai, J., & Vasarhelyi, M. (2017). Toward blockchain-based accounting and assurance. *Journal of Information Systems*, 31(3), 5–21.

Davis, F. (1985). *A technology acceptance model for empirically testing new end-user information systems: Theory and results*. Retrieved from http://dspace.mit.edu/handle/1721.1/15192. Accessed June 30, 2021.

Deloitte (2016). *Blockchain technology: A game-changer in accounting?* Retrieved from: https://www2.deloitte.com/content/dam/Deloitte/de/Documents/Innovation/Blockchain_A%20game-changer%20in%20accounting.pdf. Accessed July 30, 2020.

Deloitte (2019). *Deloitte global blockchain survey*. Retrieved from https://www2.deloitte.com/content/dam/Deloitte/se/Documents/risk/DI_2019-global-blockchain-survey.pdf. Accessed July 30, 2020.

Department of Industry Science Energy and Resources (DISER) (2020). *The national blockchain roadmap: Progressing towards a blockchain-empowered future*. Retrieved from: https://www.industry.gov.au/sites/default/files/2020-02/national-blockchain-roadmap.pdf. Accessed July 24, 2021.

Djelic, M. L., & Quack, S. (2008). Institutions and transnationalization. In: Greenwood (Ed. Oliver, C., Sahlin-Andersson, K., Suddaby, R.), *The SAGE handbook of organizational institutionalism (*pp. 299–323). Sage Publications.

Dutta, S. K. (2020). *The definitive guide to blockchain for accounting and business*, (e1, online edition). Emerald Publishing Limited.

El-Helaly, M., Ntim, C. G., & Al-Gazzar, M. (2020). Diffusion theory, national corruption and IFRS adoption around the world. *Journal of International Accounting, Auditing and Taxation*, 38(March2020), 100305.

Ethereum (2021), *Ethereum whitepaper*. Retrieved from https://ethereum.org/en/whitepaper/. Accessed December 13, 2021.

EY Global (2017). *How blockchain will revolutionize finance and auditing*. Retrieved from https://betterworkingworld.ey.com/digital/blockchain-why-finance-and-auditing-willnever-be-the-same. Accessed July 30, 2020.

FATF (2019). *Money laundering risks from "stablecoins" and other emerging assets*. Retrieved from https://www.fatf-gafi.org/publications/fatfgeneral/documents/statement-virtual-assets-global-stablecoins.html. Accessed December 13, 2021.

Finnemore, M., & Sikkink, K. (1998). International norm dynamics and political change. *International Organization*, 52(4), 887–917.

Finnemore, M. & Sikkink, K. (2001) Taking stock: The constructivist research program in international relations and comparative politics. *Annual Review of Political Science,* 4(1), 391–416.

Franck, T. M. (1990). Why a quest for legitimacy? In: T. M. Franck (Ed.*), The power of legitimacy among nations* (pp. 3–26). Oxford University Press.

Free, C., & Hecimovic, A. (2021). Global supply chains after COVID-19: The end of the road for neoliberal globalisation? *Accounting, Auditing & Accountability Journal,* 34(1), 58–84.

Fuller, S. H., & Markelevich, A. (2020). Should accountants care about blockchain? *Journal of Corporate Accounting & Finance*, 31(2), 34–46. https/doi.org/10.1108/AAAJ-06-2020-4634.

Garanina, T., Ranto, M., & Dumay, J. (2021). Blockchain in accounting research: Current trends and emerging topics, *Accounting, Auditing & Accountability Journal,* ahead-of-print. Retrieved from: https://www.emerald.com/insight/content/doi/10.1108/AAAJ-10-2020-4991/full/pdf. Accessed December 13, 2021. Doi: 10.1108/AAAJ-10-2020-4991.

Gerboth, D. L. (1972). Muddling through with the APB. *Journal of Accountancy*, 133(5), 42–49.

Gill, M. (2011). Introduction. In *Accountant's truth, knowledge and ethics in the financial world.* Oxford University Press.

Gordon, M. (1964). Postulates, principles and research in accounting. *Accounting Review*, 39(2), 251–263.

Grigg, I (2005). *Triple entry accounting.* Retrieved from https://www.researchgate.net/profile/Ian-Grigg/publication/308640258_Triple_Entry_Accounting/links/57e99c4408aed0a291304588/Triple-Entry-Accounting.pdf. Accessed June 30, 2021.

Hampl, F. & Gyönyörová, L. (2021). Can Fiat-backed Stablecoins Be Considered Cash or Cash Equivalents Under International Financial Reporting Standards Rules? *Australian Accounting Review*, 31(3), 233-255.

Hatch, J. (2021). *Council post: Harnessing the power of artificial intelligence in accounting.* Retrieved from:

https://www.forbes.com/sites/forbestechcouncil/2021/03/05/harnessing-thepower-of-artificial-intelligence-in-accounting/?sh=4c3a9241daef. Accessed July 31, 2021.

Hinchliffe, S. (2019). International dispute resolution: Circumventing the block. *Law Institute Journal*, 93(10), 40-45.

Hines, R. (1988). Financial accounting: In communicating reality, we construct reality. *Accounting, Organizations and Society*, 13(3), 251–261.

Hines, R. (1991). The FASB's conceptual framework: Financial accounting and the maintenance of the social world. *Accounting, Organizations and Society*, 16(4), 313–331.

Hodge, F. D., Kennedy, J. J., & Maines, L. A. (2004). Does search-facilitating technology improve the transparency of financial reporting? *The Accounting Review*, 79(3), 687–703.

Hopwood, A. G. (2007). Whither accounting research? *The Accounting Review*, 82(5), 1365–1374.

Iansiti, M., & Lakhani, K.R. (2017). The truth about blockchain. *Harvard Business Review*, 95(1), 3–11.

ICAEW (2017). *Blockchain and the future of accountancy*. Retrieved from https://www.icaew.com/-/media/corporate/files/technical/information-technology/technology/blockchainand-the-future-of-accountancy.ashx. Accessed July 30, 2020.

Johnston, D. (2020). *Decentralized applications white paper*. Retrieved from https://github.com/DavidJohnstonCEO/DecentralizedApplications. Accessed December 13, 2021.

Jones, E. T. (1796). *Jones's English system of book-keeping, by single or double entry, in which it is impossible for an error of the most trifling amount to be passed unnoticed; calculated effectually to prevent the evils attendant on the methods so long established; and adapted to every species of trade.* R. Edwards.

Karajovic, M., Kim, H., & Laskowski, M. (2019). Thinking outside the block: Projected phases of blockchain integration in the accounting industry. *Australian Accounting Review*, 29(2), 319–330.

Karlsson-Vinkhuyzen, S. I., & Vihma, A. (2009). Comparing the legitimacy and effectiveness of global hard and soft law: An analytical framework. *Regulation & Governance*, 3(4), 400–420.

Kend, M., & Nguyen, L. A. (2020). Big data analytics and other emerging technologies: The impact on the Australian audit and assurance profession. *Australian Accounting Review*, 30(4), 269-282.

Kim, H. M., & Laskowski, M. (2018). Toward an ontology-driven blockchain design for supply-chain provenance. *Intelligent Systems in Accounting, Finance and Management*, 25(1), 18–27.

Kokina, J., Mancha, R., & Pachamanova, D. (2017). Blockchain: Emergent industry adoption and implications for accounting. *Journal of Emerging Technologies in Accounting*, 14(2), 91–100.

Kornberger, M., Pflueger, D., & Mouritsen, J. (2017). Evaluative infrastructures: Accounting for platform organization. *Accounting, Organizations and Society*, *60 (July2017)*, 79–95.

Kotb, A., Elbardan, H., & Halabi, H. (2020). Mapping of internal audit research: A post-Enron structured literature review. *Accounting, Auditing & Accountability Journal*, 33(8), 1969–1996.

Krasner, S. D. (1982). Structural causes and regime consequences: Regimes as intervening variables. *International Organization*, 36(2), 185–205.

Lander, G. H., & Auger, K. A. (2008). The need for transparency in financial reporting. *Journal of Accounting & Organizational Change*, 4(1), 27–46.

Lapsley, I., & Wright, E. (2004). The diffusion of management accounting innovations in the public sector: A research agenda. *Management Accounting Research*, 15(3), 355–374.

Lazanis, R. (2015). *How technology behind bitcoin could transform accounting as we know it.* Retrieved from https://techvibes.com/2015/01/22/how-technology-behind-bitcoin-could-transform-accounting-as-we-know-it-2015-01-22. Accessed July 16, 2021.

Legro, J. W. (1997). Which norms matter? Revisiting the 'failure' of internationalism. *International Organization*, 51(1), 31–63.

Lessig, L. (1996). Social meaning and social norms. *University of Pennsylvania Law Review*, 144(5), 2181–2190.

Lev, B. (2019). Ending the accounting-for-intangibles status quo. *European Accounting Review*, 28(4), 713–736.

Lin, I., & Liao, T. (2017). A survey of blockchain security issues and challenges. *International Journal of Network Security*, 19(5), 653–659.

Lyytinen, K., & Damsgaard, J. (2001). What's wrong with the diffusion of innovation theory? In *Working conference on diffusing software product and process innovations* (Eds. M. A. Ardis). Springer, p. 173-190.

MacVaugh, J., & Schiavone, F. (2010). Limits to the diffusion of innovation: A literature review and integrative model. *European Journal of Innovation Management*, 13(2), 197–221.

Malekan, O. (2018). *The story of the blockchain*. Triple Smoke Stack.

Messari (2021). *Crypto theses for 2022*. Retrieved from https://messari.io/pdf/messari-report-crypto-theses-for-2022.pdf. Accessed December 13, 2021.

Miller, P., & Power, M. (2013). Economizing: Connecting accounting research and organization theory. *The Academy of Management Annals,* 7(1), 557–605.

Moll, J., & Yigitbasioglu, O. (2019). The role of internet-related technologies in shaping the work of accountants: New directions for accounting research. *The British Accounting Review*, 51(6), 100833. https://doi.org/10.1016/j.bar.2019.04.002

Moore, L. (2009). Economic reality and the myth of the bottom line. *Accounting Horizons*, 23(3), 327–340.

Morgan, G. (1988). Accounting as reality construction: Towards a new epistemology for accounting practice. *Accounting, Organizations and Society*, 13(5), 477–485.

Morton, E. F. (2019). A historical review of the rise of tax effect accounting as a financial reporting norm. *Accounting History*, 24(4), 56–590.

Morton, E., & Curran, M. (2021). Exemplifying the opportunities and limitations of blockchain technology through corporate tax losses. In T. Rana, A. Lowe, & J.

Svanberg (Eds), *Handbook of big data and analytics in accounting and auditing*. Springer.

Morton, E. F., & Curran, M. F. (2022). Technical and legal aspects of tax debt collection and cryptocurrencies. *Australian Tax Forum,* 37(1), 563–598.

Murray, P., & Pirovich, J. (2018). *The taxation of cryptocurrencies*. NSW 11th Annual Tax Forum, May 25, 2018, Sofitel Sydney Wentworth, Sydney. The Tax Institute.

Nakamoto, S. (2008). *Bitcoin: A peer-to-peer electronic cash system*. Retrieved from https://bitcoin.org/bitcoin.pdf. Accessed July 15, 2020.

O'Leary, D. (2018). Open information enterprise transactions: Business intelligence and wash and spoof transactions in blockchain and social commerce. *Intelligent Systems in Accounting, Finance and Management*, 25(1), 148–158.

Oliver, C. (1997). Sustainable competitive advantage: Combining institutional and resource-based views. *Strategic Management Journal*, 18(9), 697–713.

Panetta K (2018). *Why blockchain matters to supply chain executives*. Gartner. Retrieved from https://www.gartner.com/smarterwithgartner/why-blockchain-matters-to-supply-chain-executives/. Accessed July 9, 2020.

Pollock, A. (2008). Fair-value accounting's "truth" is dubious. *American Banker*, 173(80), 10.

Potekhina, A., & Riumkin, I. (2017). *Blockchain—A new accounting paradigm: Implications for credit risk management*. Retrieved from http://www.diva-portal.org/smash/get/diva2:1114333/FULLTEXT01.pdf. Accessed July 1, 2021.

PwC (2016). *What's next for blockchain in 2016?* Retrieved from https://www.pwc.com/us/en/financial-services/publications/viewpoints/assets/pwc-qa-whats-next-for-blockchain.pdf. Accessed July 30, 2020.

PwC (2020). *Time for trust: How blockchain will transform business and the economy.* Retrieved from https://www.pwc.com/gx/en/industries/technology/publications/blockchain-report-transform-business-economy.html. Accessed October 19, 2020.

Ramassa, P., & Leoni, G. (2021) Standard setting in times of technological change: accounting for cryptocurrency holdings. *Accounting, Auditing & Accountability Journal*, ahead-of-print, https://doi.org10.1108/AAAJ-10-2020-4968.

Reed, J. (2017). *Is blockchain enterprise-ready? A hyperledger gut check with executive director Brian Behlendorf.* Retrieved from https://diginomica.com/is-blockchain-enterprise-ready-a-hyperledger-gut-check-with-executive-director-brian-behlendorf. Accessed June 10, 2020.

Robinson, D., & Konstantopoulos, G. (2020). *Ethereum is a dark forest*. Retrieved from https://www.paradigm.xyz/2020/08/ethereum-is-a-dark-forest/. Accessed August 10, 2021.

Robinson, L. (2009). *A summary of diffusion of innovations*. ChangeoLogy, the Book.

Rogers, E.M. (1962). *Diffusion of innovations*, (1st ed.). Free Press.

Rogers, E.M. (1983). *Diffusion of innovations*, (3rd ed.). Free Press.

Rogers, E.M. (2003). *Diffusion of innovations*, (5th ed.). Free Press.

Rosenfield,P. & Dent, W.C. (1983). No more deferred taxes. *Journal of Accountancy,* 155(2), 44–55.

Rozario, A. M., & Vasarhelyi, M. A. (2018). Auditing with smart contracts. *International Journal of Digital Accounting Research*, 18(1), 1–27.

Schmitz, J., & Leoni, G. (2019). Accounting and auditing at the time of blockchain technology: A research agenda. *Australian Accounting Review*, 89(29), 331–342.

Schwab, K. (2016). *The fourth industrial revolution: What it means, how to respond.* World Economic Forum. Retrieved from https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/. Accessed July 31, 2020.

Sims, A. (2019). Blockchain and decentralised autonomous organisations (DAOs): The evolution of companies? *New Zealand Universities Law Review,* 28, 423-4458. Retrieved from https://researchspace.auckland.ac.nz/bitstream/handle/2292/50346/NZULR%20DAOs%20Accepted%20Version.pdf?sequence=4. Accessed August 23, 2020.

Statista (2021). *Statistics and facts on blockchain*. Retrieved from https://www.statista.com/topics/5122/blockchain/. Accessed July 31, 2021.

Sunstein, C. R. (1996). Social norms and social roles. *Columbia Law Review*, 96(4), 903–968.

Tharapos, M., & Marriott, N. (2020). Beauty is in the eye of the beholder: Research quality in accounting education. *The British Accounting Review*, *52*(5), 100934.

The Australian Stock Exchange (2020). *CHESS replacement*. Retrieved from https://www2.asx.com.au/markets/clearing-and-settlement-services/chess-replacement. Accessed July 24, 2021.

Tse, N. (2020). Decentralised autonomous organisations and the corporate form. *Victoria University of Wellington Law Review*, 51 (2), 313–356.

United Nations (2020). Innovations for infrastructure development and sustainable industrialization. Retrieved from https://www.un.org. Accessed July 31, 2021.

Wallace, P. (2020). Layer 1 vs Layer 2: What you need to know about different blockchain layer solutions. Medium. Retrieved from https://medium.com/the-capital/layer-1-vs-layer-2-what-you-need-to-know-about-different-blockchain-layer-solutions-69f91904ce40. Accessed July 13, 2021.

Wang, Y., & Kogan, A. (2018). Designing confidentiality-preserving blockchain-based transaction processing systems. *International Journal of Accounting Information Systems*, 30 (Sep2018), 1–18.

Wani, T. A., & Ali, S. W. (2015). Innovation diffusion theory. *Journal of General Management Research*, 3(2), 101–118.

Watson, L. A., & Mishler, C. (2017). Get ready for blockchain: Should management accountants add blockchain technology to their professional vocabulary? *Strategic Finance*, 98(7), 62–64.

West, B. P. (2003). *Professionalism and accounting rules*. Routledge.

World Economic Forum (2021). Cryptocurrencies: A guide to getting started. Retrieved from http://www3.weforum.org/docs/WEF_Getting_Started_Cryptocurrency_2021.pdf. Accessed August 7, 2021.

Yermack, D. (2017). Corporate governance and blockchains. *Review of Finance*, 21(1), 7–31.

Yu, T., Lin, Z., & Tang, Q. (2018). Blockchain: The introduction and its application in financial accounting. *Journal of Corporate Accounting & Finance*, 29(4), 37–47.

Zhang L., Pei D., & Vasarhelyi M. A. (2017). Toward a new business reporting model. *Journal of Emerging Technologies in Accounting*, 14(2), 1–15.