

LEGITIMIZING #BLOCKCHAIN: AN EMPIRICAL ANALYSIS OF FIRM-LEVEL SOCIAL MEDIA MESSAGING ON TWITTER

Research paper

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Abstract

Blockchain technology has been claimed to have the potential to disrupt a large number of industries. Despite all the hype around it, blockchain remains at a nascent state. In the early stage of the development of an IT innovation, its success is to a degree contingent on building legitimacy around it. This seems to be particularly relevant in the context of blockchain due to the questionable reputation that its most famous application, the bitcoin, has gained over time. This paper explores the usage of social media by four key actors in the blockchain ecosystem – media, IT, financial services and consulting firms – over a calendar year and through the lens of ‘organizing visions’ to identify how these organizations are trying to legitimize blockchain. Our results show that these actors employ three primary legitimation micro-level strategies through two types of legitimation mechanisms – advertising affiliations with influential field level actors (pragmatic legitimacy), describing positive market responses to blockchain and emphasizing its ongoing development (cognitive legitimacy), and describing characteristics of blockchain that are in alignment with current technological best practices (cognitive legitimacy). This paper extends the current literature on IT innovation adoption and legitimation, and contributes to the nascent literature on blockchain.

Keywords: Blockchain, Social Media, Twitter, IT Legitimation.

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1 Introduction

“Technology goes beyond mere tool making; it is a process of creating ever more powerful technology using the tools from the previous round of innovation.” –Ray Kurzweil, 2005

In 2011, the International Data Corporation (IDC), one of the leading intelligence firms for information and technology (IT), proclaimed that the IT industry was in the midst of a shift to a new platform for growth and innovation. They predicted that this so-called third platform would generate new value networks and solutions built on mobile devices and apps, cloud services, mobile broadband networks, Big Data analytics, and social technologies (IDC, 2011). Six years later and it is safe to say that these technologies are the key enablers of innovation in and through IT. Interestingly, at the same time IDC were predicting IT's third platform, Tim Worstall (2011) was predicting the death of bitcoin in Forbes Magazine. Nearly ten years since the invention of Bitcoin, over 226,000 daily transactions are completed on bitcoin network and an increasing number of merchants, including leading brands such as Overstock.com and Expedia, now accept bitcoins as payment (CoinDesk, 2017). While such advances are undeniably impressive, mainstream adoption of bitcoin has been hampered by widespread media coverage reporting its use by the criminal underworld as an anonymous and untraceable payment system which facilitates money laundering (Bryans, 2014). Whilst this paper is not focused on bitcoin, it provides a powerful case study demonstrating the influence that media discourse questioning the legitimacy of an IT innovation can have on its widespread adoption. This paper is focused on blockchain, the distributed ledger technology that enables bitcoin, and explores how key players in the current blockchain ecosystem such as media, IT, financial services and consulting firms are seeking to legitimize this powerful and potentially disruptive digital innovation.

Blockchain technology was originally developed to enable “an electronic payment system based on cryptographic proof instead of trust, allowing any two willing parties to transact directly with each other without the need for a trusted third party” (Nakamoto, 2008, p.1). Nakamoto envisaged achieving this through a peer-to-peer distributed timestamp server to generate computational proof of the chronological order of transactions. Bitcoin is termed a crypto-currency as the computational proof of transactions is hardened against tampering using cryptographic algorithms which effectively make any transaction non-reversible (Glaser et al., 2014; Nakamoto, 2008). While Nakamoto's original focus was eradicating payment fraud and transaction costs, the distributed and tamperproof ledger underlying bitcoin, the blockchain, can be applied to any process involving transfer of value and requiring full traceability and accountability. As such, blockchain can be used as a source of verifiable information (Peters and Panayi, 2015). Fichman, Dos Santos and Zheng (2014, p. 330) define a digital innovation as a “product, process, or business model that is perceived as new, requires some significant changes on the part of adopters, and is embodied in or enabled by IT”. Looking at blockchain through this lens, its potential transformative power is evident. Unsurprisingly, blockchain is being applied to a myriad of new solutions for smart contracts, private equity trading, diamond certification, public notary/document certification, digital storage, identity management, anti-counterfeit solutions amongst others (Crosby et al., 2016). However, while established players in the IT and financial services sectors including IBM, Samsung, Amazon, Barclays, Goldman Sachs, Citigroup and State Street are investing heavily in blockchain technologies (Crosby et al., 2016; Walsh et al., 2016), bitcoin's legitimacy has been questioned by regulators (Blundell-Wignall, 2014; European Central Bank, 2012; Interpol, 2017). Bitcoin is not the only application of blockchain, but it is arguably the most famous. This generates confusion among the general public (Culpan, 2017; Lucas, 2017) and in light of the bad reputation that bitcoin has developed over time, potential damage for blockchain technology. Indeed, failure to achieve legitimation can reduce adoption and result in the failure of new digital innovations (Flynn and Du, 2012). Blockchain is still at an early stage of development with IT, financial services and consulting firms leading the innovation process (Miles, 2017), and media extensively covering major events in the ecosystem (Hsieh et al., 2017; Umeh, 2016). Thus, these actors may play a critical role in building legitimacy around blockchain technology, particularly the early stages of

development. This paper seeks to understand if, how, and to what extent these organizations are seeking to legitimize blockchain through their social media communications.

There is a well-established literature base concerning the adoption of IT innovations with a plethora of theoretical, primarily rationalistic, lenses through which the research community has examined the determinants of IT diffusion and assimilation, typically from an organizational perspective with a predominant emphasis on employees' adoption and sustained usage of new technologies. These include Diffusion of Innovation (DOI) (Rogers, 2003), Technology-Organization-Environment (TOE) (Tornatzky and Fleischer, 1990), Information Processing View (IPV) (Melville and Ramirez, 2008), Technology Acceptance Model (TAM) (Davis, 1989), and Human-Organization-Technology fit (HOT-fit) (Yusof et al., 2008), to name but a few. Following calls for alternative analytical lenses for technology adoption, researchers have shifted focus to the examination of the antecedents to technology adoption from community and inter-organizational perspectives (Kaganer et al., 2010; Hsu et al., 2014; Lyytinen and Damsgaard, 2001; Swanson and Ramiller, 1997). In the context of blockchain, technology adoption models sustain their relevance for studies seeking to understand the factors driving adoption decisions within organizations. However, the nascent state of blockchain points to the need for research focusing on how organizations seek to legitimize blockchain using public *fora* as an antecedent of these adoption decisions. At such an early stage of diffusion, the success of new innovations is to a degree contingent on achieving interest from a diverse range of organizations, termed the community (Wang and Swanson, 2007).

Traditionally, business communication tends to be categorized as either businesses-to-business (B2B) or business-to-consumers (B2C). However, social media creates public fora that facilitates interactions with and between multiple audiences (Marwick and Boyd, 2010). This can be particularly relevant when discussing a topic like blockchain, which can underpin both B2B and B2C applications (Subamanian, 2018). As a such, in this study we define a community as a network of person-to-person relations (Hunsinger and Senft, 2013). This research explores how a common focal idea of a digital innovation is formed and develops over time through generative discourse within a community, a concept which Swanson and Ramiller (1997, p.460) term 'organizing visions'. These organizing visions serve three functions within a community, namely (a) interpretation of the nature and purpose of the innovation; (b) legitimation of the innovation as good practice; and (c) mobilization of the market to realize the potential of the innovation (Ramiller and Swanson, 2003). The evolution and reconstitution of the organizing vision over time through rhetorical discourse helps shape practitioner thinking about the innovation and can foster future adoption (Ramiller and Swanson, 2003). Building on Swanson and Ramiller (1997), Kaganer et al. (2010) have developed a comprehensive framework to explore the strategies social actors use to legitimize an IT innovation in a community. The resulting IT Legitimation Taxonomy comprises 26 strategies organized in to four types of legitimacy i.e. cognitive, pragmatic, normative and regulative (Kaganer et al., 2010). Given the questioning surrounding the legitimacy of blockchain, it is important from a practical standpoint to understand how organizations invested in its development leverage these strategies and seek to describe the nature of blockchain, legitimize it as positive advance within the IT and financial services industries, thereby mobilizing organizations to adopt.

This paper explores the usage of social media over a calendar year (July 2015 – June 2016) by four relevant actor types namely media, IT, financial services and consulting firms to legitimize blockchain. We use Twitter as an empirical context as it is a large open network used extensively by the target community. Our research objectives are threefold: (a) to apply the IT Legitimation Taxonomy to the context of firm-level messaging on the topic of blockchain to identify the types of legitimacy strategies used by four actor types in the blockchain community, (b) to assess the utility of social media datasets for legitimation research, and (c) to identify future avenues for legitimation research on related topics using social media datasets. Post-hoc cross-sectional pattern analysis by actor type was used to explore patterns in the micro-level strategies of 465 users (312 firms) as evidenced in 3,653 tweets in the blockchain sub-network on Twitter over a twelve-month period.

The remainder of this paper is organized as follows. The next section reviews the existing literature on IT adoption, legitimation of IT innovations, and blockchain. Next, the empirical context and research method

is presented, followed by an analysis of the results. We then discuss the findings of the research and conclude with a summary of the theoretical and practical implications of this study, and by identifying future avenues for research.

2 From IT Adoption to IT Legitimation

Historically, two dominant themes underlie the literature on IT innovation adoption. First, extant literature largely focuses on the adopting organization and the characteristics of the organization that determine the successful adoption and assimilation of an IT innovation (Rodón and Sesé, 2010). Secondly, and relatedly, existing work is predominately based on economic-rationalistic models (Fichman, 2004; Strang and Macy, 2001). The resulting wealth of literature provides a myriad of firm-level theories to explain “whether, when, and how to innovate with information technology” (Swanson and Ramiller, 2004, p. 553). Indeed, technology adoption models such as TAM and Unified Theory of Acceptance and Use of Technology (UTAUT) are routinely leveraged to understand the adoption of new IT innovations across various industries including health (see, among others, Ifinedo, 2012). These theories and their widespread utilization are discussed in greater detail in numerous literature review papers including Prescott and Conger (1995), Fichman (2000), Venkatesh et al. (2003) and Brown et al. (2014) to name but a few. The majority of prior work also focuses on the characteristics of the new innovation which drive the adoption decisions of employees across a wide array of industries and innovations. The primary limitations associated with this approach include the assumption that organizations or individuals adopt technologies based purely on rational thinking (Lei, 2016), and failure to acknowledge or understand the cultural and environmental influences at play (Hsu, Lin, and Wang, 2014). Moreover, despite the emphasis on the organization as the unit of analysis, there has been a long-standing recognition that such organizations exist within a social system (or contextual environment) and are influenced by other stakeholders within that system (Orlowski and Barley, 2001; Rogers, 2003; Walsham and Waema, 1994). In response, a number of perspectives have emerged which explain the role that such external influences play in shaping IT innovation adoption decisions including what Fichman (2004, p.320) terms social contagion, management fashion and technology destiny. Social contagion refers to the processes organizations use to influence other organizations to adopt an IT innovation (Lei 2016). Social contagion recognizes that organizations feel social pressure to adopt an IT innovation based on past adoption by others. Similarly, management fashion recognizes that organizations are influenced by fashionable discourse by management-knowledge entrepreneurs and is said to play a dominant role in influencing adoption and diffusion (Lei, 2016). Technology destiny, is more nuanced in that it posits that organizations are influenced by the ultimate disposition of a technology at the point it is no longer considered to be something new by a community. In such a context, decisions to adopt are based on the belief of a community that it will be adopted or abandoned. Swanson and Ramiller (1997) propose the concept of ‘organizing visions’ as an inter-organizational lens of IT innovation analysis. Here, the wider external community, similar to Rogers’ (2003) social system, jointly shapes, creates and employs an organizing vision of an IS innovation that is central to its diffusion across all stages of adoption. Driven by an evolving and generative discourse within a community made of diverse actors, the organizing vision serves three functions: interpretation, legitimation, and mobilization of the market (Swanson and Ramiller, 1997). Given the questions surrounding the legitimacy of blockchain, this paper adopts the organizing vision lens to understand the efforts of different actors in the community to describe blockchain, legitimize it as positive advancement, and mobilize other organizations to adopt.

The objective of this paper is not to investigate the determinants of blockchain adoption, but to understand the social processes and strategic actions that firms take to build the legitimacy of an IT innovation. Legitimation research in the IT domain arose to address rationales for accepting or rejecting a particular IT innovation (Hirschheim and Klein, 1989). Our conceptualization of legitimacy is based on Suchman’s (1995, p.574) definition of legitimacy as a “a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed systems of norms, beliefs, and definitions.” Kaganer et al. (2010) identify four main forms of legitimacy; cognitive legitimacy, pragmatic

legitimacy, normative legitimacy, and regulative legitimacy. Cognitive legitimacy relates to the diffusion of knowledge about an innovation within a community (Aldrich and Fiol, 1994). For Suchman (1995), cognitive legitimacy is established through comprehensibility and taken-for-grantedness, the latter not being dissimilar to Fichman’s (2003) technology destiny. Pragmatic legitimacy is related to the economic-rationalistic models within the IT adoption research tradition. Here, legitimacy is informed by self-interest and utility to an organization’s most immediate stakeholders (Suchman, 1995). In contrast to pragmatic legitimacy, normative legitimacy is predicated on an alignment of norms and values between the innovating entity and the social system (Suchman, 1995). While normative legitimacy focuses on a form of moral rightness, regulative legitimacy is based on the alignment of innovations with legal or regulative practice (Kaganer et al., 2010). Kaganer et al. (2010) note that cognitive, pragmatic and regulative legitimacy may be combined as a meta-form, socio-political legitimacy, as per Aldrich and Fiol (1994) and Wang and Swanson (2007).

Despite the small number of studies focused on legitimation within the IS domain, a number of relevant frameworks exist to guide the exploration of legitimation activity. For instance, Flynn and Hussain (2004) propose a Legitimation Activity Model (LAM), a cycle comprising seven stages which explains the interplay between legitimation seekers (project authorities) and legitimation providers (project recipients). While the LAM was originally conceptualized as a firm-level framework, it has been suggested that it could be applied to include a wider group of stakeholders (Flynn and Du 2012). LAM was updated to form the Integrated Legitimation Activity Model (ILAM) illustrated in Figure 1, which acknowledges the need to continually monitor and evaluate legitimation efforts and adjust legitimation strategies as a result (Du and Flynn, 2010). This study supports the need to gain legitimation and monitor legitimation efforts as outlined in ILAM and seeks to (a) understand the legitimation strategies utilized by organizations on the topic of blockchain and (b) provide practical insights which guide the evaluation and adjustment of legitimation strategies among this community.

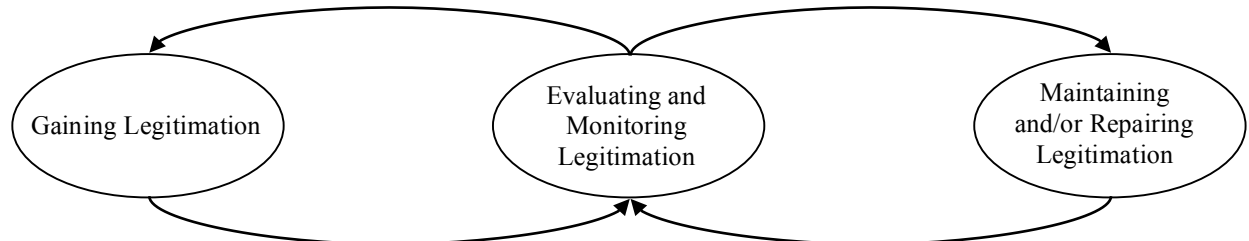


Figure 1. Integrated Legitimation Activity Model (Du and Flynn 2010)

In order to identify micro-level strategies employed by actors to build legitimacy for new ventures and innovations, Kaganer et al. (2010) propose an IT Legitimation Taxonomy comprising 26 micro-level strategies organized by legitimacy form. Unlike LAM, the IT Legitimation Taxonomy was specifically designed to explore legitimacy building within the wider context of organizing visions (Kaganer et al., 2010, p. 2). The IT Legitimation Taxonomy was developed in the context of a Computerized Physician Order Entry System (CPOE) implementation project. The IT Legitimation Taxonomy applied to the CPOE project use case is presented in the Appendix. This study leverages the IT Legitimation Taxonomy in order to understand organizations’ efforts to gain legitimacy for blockchain, the first stage in the iterative ILAM model. Specifically, while previous studies rely on more formal communication channels like press releases, the study seeks to determine the applicability of this legitimacy taxonomy and the wider organizing visions lens to the context of corporate social media communication and ascertain which of the 26 strategies organizations are pursuing.

2.1 Blockchain: A Potentially Disruptive Innovation

The common technical definition of blockchain is a decentralized and distributed, peer-to-peer, cryptographically secured ledger (Niederman et al., 2017; Yli-Huumo et al., 2016). More recently, Mougayar (2016) proposed to integrate this technical definition with a business and legal definition. From a business perspective, the blockchain is an exchange network for moving transactions, value, assets between peers, without intermediaries, while, from a legal perspective, the blockchain is a technology to validate transactions, replacing trusted entities.

A blockchain replaces a trustworthy third party involved in a transaction with cryptographic proof and in so doing allows two parties to execute an online transaction peer-to-peer. Blockchain uses public key infrastructure (PKI) mechanisms (Housley, 2004) to execute transactions. Each transaction is protected through a digital signature, sent to the “public key” of the receiver, and digitally signed using the “private key” of the sender. The receiver verifies the digital signature, which implies ownership of the corresponding “private key”, by using the “public key” of the sender on the respective transaction. Each transaction is then spread across the network and, if a specific percentage of the nodes in the network agrees on its validity, the transaction is approved. The validation process verifies that the sender owns the asset being exchanged, and that the asset has not been simultaneously exchanged in another transaction. The approved transaction is then recorded in a public ledger and all the transactions validated within a specific time period are grouped into blocks. Each block is then sealed through a consensus mechanism called, in the case of the bitcoin blockchain, proof-of-work¹; once the network has agreed on the validity of the transactions in the block, it closes the block and links it to the previous block to form the blockchain. Once a block has been closed, all the records in it are visible to all the nodes but they can no longer be modified. This approach has a number of benefits and challenges as enumerated by Rosati et al. (2016) and summarized in Table 1.

In summary, blockchain is an IT innovation at an early stage of diffusion but with the potential to disrupt IT, financial services and many other industries and generate significant benefits for the overall economy. The extant literature on technology adoption and diffusion can provide insights into the predictors of adoption for a myriad of technologies. However, such an approach may not be appropriate in the context of blockchain for two reasons. First, blockchain is a complex IT innovation which comprises a high degree of interconnectedness transcending organizational boundaries. Blockchain is distributed by definition and, as such, individual adoption decisions are not sufficient, rather adopter configuration between different organizations sharing organization vision is required (Brandt, 2014). Second, due to the nascence of blockchain and questions surrounding its legitimacy, technology adoption is not an urgent consideration. Of greater importance is understanding the efforts of organizations within the community to legitimize blockchain as legitimation is a prerequisite step to achieving mass adoption and ultimate success (Wang and Swanson, 2007). Thus, this research adopts the organizing visions lens and seeks to explore the following research question:

RQ: Which legitimation strategies do organizations invested in blockchain development adopt on Twitter?

¹ The Proof of Work mechanism requires that certain computers on the network (“miners”) solve computationally-intensive mathematical processes, while others verify that the solution to that puzzle does not correspond to a previous transaction (Wright and De Filippi, 2015). Other less computationally-intensive consensus mechanisms are being explored such as Proof of Stake (Kiayias et al., 2017) and Proof of Authority (Knirsch, Unterweger and Engel, 2017).

3 Research Method

3.1 Empirical Context

In the last decade, usage of social media has expanded to the stage of near ubiquity (Brooks, 2015). Social media comprises both the conduits and the content disseminated through interactions between individuals and organizations (Kietzmann et al., 2011). As such, it includes the set of web-based and mobile tools and applications that allow users to create (consume) content that can be consumed (created) by others and which facilitates connections (Hoffman and Novak, 2012; Huang et al., 2017). Social media is nowadays widely used in the workplace to support many business objectives including recruitment and selection, onboarding, training and development, knowledge sharing, branding and marketing, creativity and problem solving, and influencing organizational culture/change (Ployhart, 2012). As well as market activities, there is evidence of corporate use of social media to support non-market activities such as corporate social responsibility, corporate political activity and other forms of socio-political involvement (Lynn et al., 2017). According to Kietzmann et al. (2011), social media platforms differ by the extent to which they focus on seven functional building blocks – i.e. identity, conversation, sharing, presence, relationship, reputation and groups. Twitter, one of the largest social media platforms in the world with over 328 million active users in the first quarter of 2017 (Twitter, 2017), has been designed around four of these building blocks, namely identity, conversation, sharing, and reputation (Kietzmann et al., 2012). We have selected Twitter as our empirical context as it is large, growing, and widely used by the target audience of our study, namely the media and established firms operating in the IT, financial services, and consulting sectors (Tiago and Veríssimo, 2014). Twitter has two characteristics that make it particularly useful for academic research, corporate communications and legitimation activity. Firstly, it is largely an open network; most content and interactions are in the public domain therefore it represents an effective medium for information diffusion (Son et al., 2013). Secondly, hashtags are used widely to enable users identify other users, typically strangers, with similar or opposing interests and have been found to be a useful mechanism for coordinating ad hoc and calculated publics (Bruns and Burgess, 2011). No published research was identified by the authors on the use of social media for the legitimation of IT innovations or the use of legitimation in the context of blockchain. As such, this empirical context is both timely and novel.

3.2 Research Design

Our study focuses on Twitter usage by four actor types; the media, IT, financial services and consulting firms. The media is selected as research suggests the media provides a measure of organizational legitimacy and affects perceptions of legitimacy (Baum and Powell, 1995; Elsbach, 1994; Fombrun, 1996). The IT sector is selected as blockchain is an IT innovation. The financial services sector is one of the sectors investing heavily to improve this technology and such investments are expected to grow significantly in the near future (KPMG, 2016). Consulting firms have been included as they provide market knowledge to both the technology originators and those seeking to apply blockchain. In other words, these actors are playing a key role in blockchain development and disseminating information to the general public therefore preparing the field for a widespread adoption. This study relates to the Twitter discourse relating to blockchain over the twelve-month period from 1 July 2015 to 30 June 2016. We retrieved all English-language tweets containing the hashtags #blockchain and/or the keyword 'blockchain' using the Historical Powertrack API (GNIP) under commercial license. The use of the GNIP API avoided sampling issues reported by researchers using the limited public Twitter streaming API (Morstatter, Pfeffer, Liu and Carley, 2013) and included wider range of data per tweet. GNIP data included the text of messages, time-stamp, user, geographical location, Uniform Resource Locators (URLs), and whether a message was an original

Benefits	Description
Disintermediation	As a peer-to-peer network, blockchain allows two parties to complete a transaction without the intermediation of a third party.
Empowered users	Users are in control of all the information and transactions.
High quality data	Blockchain data is complete, consistent, timely, accurate, and widely available.
Process integrity	Transactions are executed in a standardized and transparent way.
Durability and reliability	Blockchain does not have a single point of failure and therefore is better able to withstand malicious attacks.
Transparency and immutability	Changes to the blockchain are viewable to all participants in the network and the transaction stored cannot be changed.
Ecosystem simplification	Blockchain provides a single storage point for records.
Faster transactions	Since the network approves transactions, they can be processed constantly without any delay.
Lower transaction costs	By eliminating all intermediaries, a blockchain lowers transaction costs.
Challenges	Description
Nascent technology	Blockchain technology still under-performs in terms of speed, scalability and efficiency compared to the most technologies currently adopted.
Regulation	Some applications of blockchain technology are unregulated and/or are prohibited.
Energy costs	Blockchains require a significant amount of computing power and, therefore, electricity.
Security and privacy	Proprietary blockchains may not have a critical mass of nodes to discourage a motivated malfeasant. The anonymous nature of blockchain presents issues to be addressed before the general public will entrust their personal data to a blockchain.
Migration concerns	Blockchain systems requires significant changes in existing systems, if not complete replacement, therefore the transition must be planned and carefully managed.
Culture	Blockchain represents a significant change from a cultural point of view. Such a change is typically complex and require enough time and effort.
Initial investment	The adoption of blockchain-based solutions requires a significant upfront investment and this may be a deterrent.

Table 1. *Benefits and Challenges of Blockchain (Rosati, Nair and Lynn, 2016)*

tweet, a retweet or a reply. We also retrieved users’ influence score from the Klout Score² API. The initial dataset comprised 1,443,218 tweets from 213,580 Twitter accounts, of which 867,444 (60 percent) were original posts and 575,774 (40 percent) retweets. The dataset was reduced by (a) only including verified accounts and accounts with a Klout score of 75 in order to extract only corporate accounts which are able to attract and influence a large audience; and (b) original posts since the objective of the study is to examine the content firms created, not the content they shared. The remaining accounts were manually filtered so that only media, IT, financial services and consulting firms were included. The final dataset comprised 3,653 tweets from 465 Twitter accounts representing 312 firms. Table 2 summarizes the number of Twitter accounts and firms by actor type.

² The Klout Score is a measure of a user’s influence on social media and has been widely adopted in recent research (Edwards et al., 2013; Rao et al., 2015; Lynn, Rosati and Nair, 2017).

Type	No. of Accounts	No. of Firms
Media	246	159
IT	96	66
Financial Services	72	63
Consulting	51	24
Total	465	312

Table 2. Number of Accounts and Firms by Actor Type

A coding scheme was developed based on the IT Legitimation Taxonomy (Kaganer et al., 2010) and adapted for a general IT context. Two coders independently interpreted the intent of each tweet based on the full text of the tweet and classified each message into one of the 26 categories in the taxonomy as per Kaganer et al. (2010) or as ‘Other’ if a clear legitimization strategy did not emerge. Inter-rater reliability with a Kappa co-efficient of 0.81, and a Cronbach's alpha of 0.90 was achieved. Data was analyzed for two types of patterns in the use of legitimization strategies on Twitter: (a) patterns in the overall use of legitimization strategies, and (b) patterns in the use of legitimization strategies by target actor i.e. media, IT, financial services or consulting firms.

4 Analysis and Findings

Figure 2 presents the percentage of tweets associated with each micro-level legitimization strategy. The four most adopted strategies are P13 (Alliance Field Level Actor), C7 (Diffusion Organizational), C3 (System Characteristics), N2 (Normative – Transformational). Specifically, 22.42% of the tweets are associated with attempts to build pragmatic legitimacy (P13), 26.36% are associated with cognitive legitimacy (13.85% with C7 and 12.51% with C3), and 11.52% with normative legitimacy (N2). In other words, the actors examined tend to use Twitter to highlight the direct benefits the technology might generate (i.e. pragmatic legitimacy) and to spread knowledge of blockchain to the public (i.e. cognitive legitimacy).

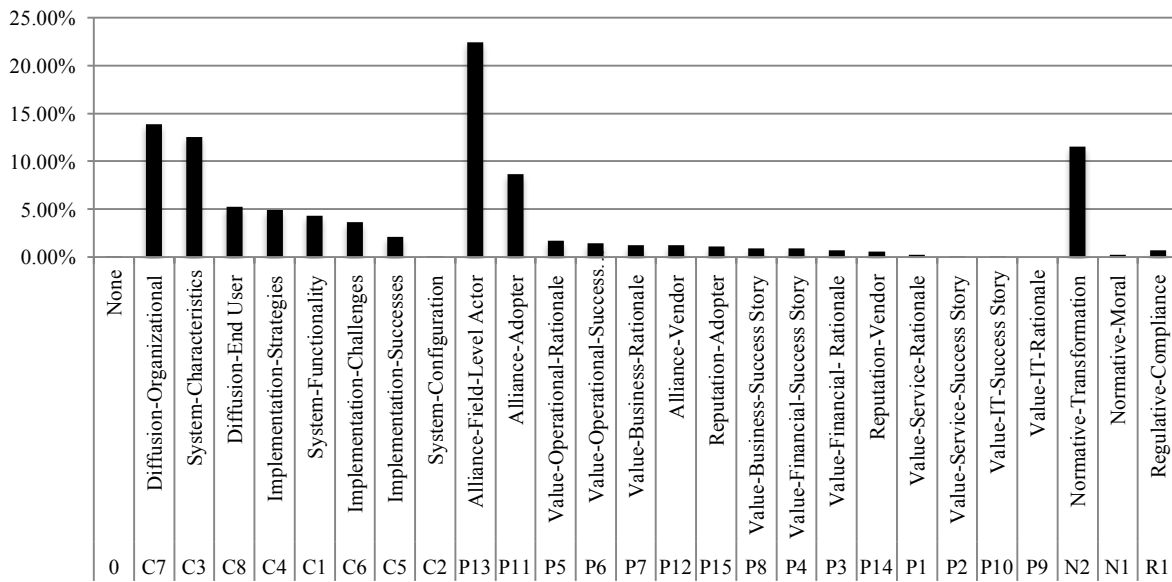


Figure 2. Use of Legitimation Strategies.

Firms attempt to build pragmatic legitimacy by sharing general endorsements of technology-related initiatives from government initiatives to initiatives by well-known brands and alliances. In contrast, attempts to build cognitive legitimacy were pursued by describing (a) positive market response to the blockchain, (b) effective and potential adoption/testing, and (c) how blockchain improves technological practices. Interestingly, almost 15% of the tweets in our dataset are associated with attempts to build

normative legitimacy by highlighting the importance of adopting innovative technologies to adapt to potential change in the business environment (Abrahamson, 1996; Avgerou and Madon, 2004; Kaganer et al., 2010). Normative legitimacy strategies are not usually adopted for IT innovations, which tend to be more associated with cognitive and pragmatic legitimacy (Kaganer et al., 2010). This finding might be interpreted as further confirmation of the fact that blockchain is not merely a technology innovation as it brings together ‘philosophical, cultural and ideological underpinnings that must also be understood’ (Mougayar, 2016). There are only 46 tweets in our dataset associated with attempts to build regulative legitimacy. Such a finding might be interpreted as a further confirmation of the marginal role that regulation continues to play in the blockchain ecosystem and the community’s desire to avoid conflating blockchain with the wider concerns surrounding bitcoin regulation. Indeed, regulators struggle to take a clear position on blockchain given the early stage of the technology and the enduring murkiness surrounding its potential benefits and limitations. Table 3 presents examples of tweets by legitimacy type.

Type	Example
Pragmatic	<ul style="list-style-type: none"> • Britain looking at blockchain for tracking taxpayer money • This JPMorgan memo shows it is ‘aggressively’ investing in blockchain tech and robotics • Mizuho Financial Group partners with IBM to test #blockchain for settlements
Cognitive	<ul style="list-style-type: none"> • Westpac is the 43rd bank in a consortium developing the blockchain • Blockchain spending expected to exceed \$1 billion this year — report • #Blockchain validates integrity and accuracy before accepting transactions. Once accepted transactions cannot be changed, reversed or erased
Normative	<ul style="list-style-type: none"> • CEOs of large orgs say technologies like blockchain; #IoT will render their industries unrecognizable in 5 years • Distributed ledgers like #Blockchain are likely to cause widespread disruption
Regulative	<ul style="list-style-type: none"> • EU lawmakers to hold off from regulating blockchain for now https://t.co/lpo4rHbBdSe • “Regulators want #blockchain tech to succeed. They recognize that they need to evolve and understand.” Steve Mollenkamp @IBM #Fintech Forum

Table 3. Examples of Tweets by Legitimacy Type

IT and media firms are the most represented in our dataset with 303 and 256 unique users respectively. Financial services and consulting firms have a much lower representation with 72 and 51 unique users respectively. Despite this lower representation, financial services and consulting firms are significantly more active than IT and media firms in the dataset. Financial services and consulting users generated, on average, 11.96 and 11.85 tweets respectively, while media and IT users generated only 6.32 and 2.10 tweets. This finding confirms the key role that financial services and consulting firms are playing in the blockchain innovation community on Twitter compared to IT and media firms. In terms of micro-level legitimation strategies, each of the actors examined attempt to build pragmatic (P13), cognitive (C7 and C3) and normative legitimacy (N2). The order of preference varies slightly with IT companies paying more attention to cognitive legitimacy than normative legitimacy. This is in line with the technical focus of IT companies in the blockchain ecosystem. Table 4 presents a summary of the participation of each actor type in the #blockchain community and the micro-level legitimation strategies implemented. An additional finding of our study is the lack of tweets carrying negative opinions towards the blockchain. Sentiment analysis was conducted on the text of the tweets and the results confirmed that 96% of the tweets have a neutral (sentiment score equal to 0) or slightly positive or negative sentiment (sentiment score equal to -1 or 1). This could be interpreted in a number of ways. One perspective might be that the nature of messaging around an enabling technology rather than an application of such a technology is more likely to information oriented rather than opinion-oriented. An alternative might be that this confirms the more positive attitude of IT, media, financial services and consulting firms have toward the blockchain technology and of their

Actor Type	Descriptive		Strategies implemented	
			Code	No. of Tweets
Media	Tot. No. of tweets	1554	P13	406
	No. of users	246	C7	203
	Avg. User Activity	6.32	N2	155
			C3	144
IT	Tot. No. of tweets	636	P13	138
	No. of users	303	C3	135
	Avg. User Activity	2.10	C7	66
			N2	61
Financial Services	Tot. No. of tweets	853	P13	183
	No. of users	72	C7	135
	Avg. User Activity	11.85	N2	117
			C3	89
Consulting	Tot. No. of tweets	610	P13	102
	No. of users	51	C7	92
	Avg. User Activity	11.96	N2	89
			C3	88

Table 4. Activity and Micro-Level Legitimation Strategy

effort to legitimize the technology rather than reinforce the hype around it with extremely positive messages.

5 Conclusion, Limitations and Future Research

In line with our three research objectives, this paper makes several contributions which advance IS research on the legitimation of an IT innovation in the context of blockchain. First, this paper leverages an inter-organizational perspective to extend IT innovation adoption research beyond the current focus on one organization or adoption between two organizations to a new focus on the broader blockchain community of four key actor types. Findings show that there are a greater number of media and IT firms engaging in legitimation discourse related to blockchain on Twitter but financial service firms and consulting firms are more active in this conversation. The paper thus not only adopts a broader focus than existing studies, but it accounts for the connectedness of emerging innovations such as blockchain and acknowledges and supports the differing roles that a diverse range of organizations can play in achieving its legitimation (Brandt, 2014).

Second, the paper advances IS and blockchain research through a novel application of the IT Legitimation Taxonomy to firm-level messaging. The paper responds to calls for studies on cross-sectional legitimation pattern analysis across different actors (Kaganer et al., 2010, p. 22) thereby illustrating the applicability of the IT Legitimation Taxonomy to this context. The paper provides insights into the types of legitimation strategies utilized by the four actor types. The primary micro-level legitimation strategies employed by all actors focused on two types of legitimation mechanisms; advertising affiliations with influential field level actors (pragmatic legitimacy), describing positive market responses to blockchain and emphasizing ongoing development of blockchain solutions (cognitive legitimacy), and describing the characteristics of blockchain which align with current technological best practices (cognitive legitimacy). At the actor-level, IT actors are unsurprisingly more concerned with technology-related micro-level strategies e.g. system characteristics. As a result, and in line with our first research objective, this research supports the generalizability and validation of the organizing visions lens and the IT Legitimation Taxonomy proposed

by Kaganer et al. (2010). The findings clearly demonstrate the utility of this taxonomy for understanding how established industry actors are using micro-level legitimation strategies to legitimize blockchain, consciously or unconsciously, using social media and through issue-centered sub-networks on Twitter.

Third and relatedly, the paper represents a methodological advance through the leveraging of Twitter as a data source. Case studies are prevalent in legitimation research, but social media data sets provide a novel and substantive source for empirical research on how legitimacy is built. Our study is not only one of the first studies on building legitimation of blockchain but also one of the first studies on IT legitimation, indeed IT innovation diffusion, using social media data as a source. While existing studies which utilize interpretative case study approaches have led to the development of useful frameworks (e.g. Du and Flynn, 2010; Kaganer et al., 2010), such approaches have limitations in that legitimation efforts are often examined retrospectively, and the role of social processes and actors is ignored. The data showed that all actor types engage in legitimation strategies thereby supporting the use of social media datasets in legitimation research achieving our second research objective. Moreover, the findings across all actor types support the use of the Integrated Legitimation Activity Model to understand legitimation generation among a broader community of key actors.

The research also has practical implications for those seeking to legitimize blockchain and IT innovations more generally using social media and Twitter specifically. For both innovation entrepreneurs and their social media operators, the IT Legitimation Taxonomy presents a menu of approaches to stimulate both knowledge sharing, and branding and marketing activities.

There are several limitations to our research which also indicate potential avenues for further research. Firstly, Kaganer et al. (2010) both employed and called for more temporal legitimation pattern analysis. Our data is based on one year of activity; a multi-year study may provide greater insights into both how actors have entered (and exited) the discourse on blockchain, how focal ideas have evolved, and which actors have been influential in such evolution. As blockchain is at an early stage of legitimation, this paper represents a snapshot in a continuum. Secondly, while we have responded to Kaganer et al.'s (2010) call for cross-sectional legitimation pattern analysis across different actors, we have limited it to four specific types of actors of a certain size, maturity and social media influence. A study of all the actors engaged in the blockchain discourse would provide interesting insights on the structure of the blockchain sub-network on Twitter. Thirdly, our study focuses on one IT innovation, blockchain. Again, Kaganer et al. (2010) has called for research using cross sectional legitimation pattern analysis across different innovations. There are two immediate opportunities: comparing the strategies employed by (a) a related innovation community, in this case, Bitcoin, and (b) an entirely different innovation community potentially representing, as Kaganer et al. (2010) suggest, success or failure. Fourthly, we made use of data from one social network and limited our analysis to screen-names and original posts. A comparison of strategies across social networks as proposed by Lynn et al. (2015) may provide a fuller picture and interesting insights on firm-level and channel-level strategies and communities. For example, the effectiveness of specific micro-level legitimation strategies could be evaluated by analyzing electronic word of mouth impact through use of retweets, mentions and other social media data as per Gourinovitch et al. (2017). Finally, another potential development of this study is to develop an alternative and more context-specific legitimization taxonomy using clustering techniques.

Blockchain has the potential to disrupt the IT and financial services industries, along with several others. However, at present this digital innovation is in the early stages of diffusion and its legitimacy has been questioned. Therefore, in order to ensure the eventual successful diffusion of blockchain, invested organizations must ensure its legitimacy is demonstrated and widely accepted. This study explores the legitimation efforts of four actor types within the wider blockchain community in line with the organizing visions lens to understand current legitimation strategies deployed on Twitter and provide insights which can guide the refinement and further development of these strategies.

6 Appendix

Code	Strategy Name	Strategy Description
C1	System-Functionality	Explicitly define key features, attributes, and usage conditions of the innovation.
C2	System-Configuration	Explicitly define key characteristics of the verifying IT artifact.
C3	System-Characteristics	Describe characteristics of the innovation that are in alignment with current technological best practices.
C4	Implementation-Strategies	Describe implementation strategies/success factors.
C5	Implementation-Successes	Describe implementation successes (examples).
C6	Implementation-Challenges	Discuss challenges/risks associated with the innovation.
C7	Diffusion-Organizational	Describe positive market response to the innovation; emphasize ongoing development of the innovation.
C8	Diffusion-End User	Stress acceptance of the innovation by end users.
P1	Value-Clinical-Rationale	Explain how the innovation improves quality of service in an adopter organization.
P2	Value-Success-Story	Provide examples of how the innovation improves quality of service in an adopter organization.
P3	Value-Financial-Rationale	Explain how the innovation improves financial performance of an adopter organization.
P4	Value-Financial-Success Story	Provide examples of how the innovation improves financial performance of an adopter organization.
P5	Value-Operational-Rationale	Explain how the innovation improves operational performance of an adopter organization.
P6	Value-Operational-Success Story	Provide examples of how the innovation improves operational performance of an adopter organization.
P7	Value-Business-Rationale	Explain how the innovation improves general business performance of an adopter organization.
P8	Value-Business-Success Story	Provide examples of how the innovation improves general business performance of an adopter organization.
P9	Value-IT-Rationale	Explain how the innovation improves management of IT in an adopter organization.
P10	Value-IT-Success Story	Provide examples of how the innovation improves management of IT in an adopter organization.
P11	Alliance-Adopter	Advertise collaborative long-term relationships with adopters.
P12	Alliance-Vendor	Advertise partnerships/collaborations with other innovation entrepreneurs (e.g. vendors, consultants).
P13	Alliance-Field-Level Actor	Advertise affiliation with influential field level actors.
P14	Reputation-Vendor	Emphasize the innovation entrepreneurs' strong reputation in the innovation domain and related areas.
P15	Reputation-Adopter	Describe (favorable) characteristics/stress reputation of adopter organization.
N1	Normative-Moral	Stress congruence of the innovation with prevailing moral norms; provide examples.
N2	Normative-Transformation	Emphasize the ongoing transformation of the adopters' industry; stress the enabling role of the innovation.
R1	Regulative-Compliance	Stress compliance with legal and quasi-legal rules and regulations

Appendix. IT Legitimation Taxonomy (adapted from Kaganer et al., 2010)

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