Bitcoin and the Role of Social Media: An Empirical Analysis of Firm Level Legitimation Strategies

Pierangelo Rosati, Grace Fox, Theo Lynn
Irish Centre for Cloud Computing and Commerce
DCU Business School
{pierangelo.rosati;grace.fox;theo.lynn}@dcu.ie

Abstract

Since its recent emergence as a solution to double spending issues and mistrust in financial institutions, Bitcoin has experienced exponential growth. However, as Bitcoin enables anonymity, it facilitates illegitimate payments which has resulted in negative media coverage and questions surrounding its legitimacy. The continued success of Bitcoin is largely contingent on achieving acceptance as a legitimate IT innovation. This paper explores the legitimation strategies leveraged by four key actors in the Bitcoin ecosystem – media, IT, financial services and consulting firms – on Twitter. Empirical evidence suggests a current lack of clear communication strategies for building Bitcoin legitimacy. In fact, most of the tweets are not associated with specific legitimation strategies, and those which do encompass legitimation are almost equally spread across cognitive, pragmatic and normative legitimacy strategies. This paper extends legitimation theory to the context of Bitcoin and provides important practical insights to guide the future legitimation efforts of organizations invested in the success of Bitcoin.

* Corresponding author: Irish Centre for Cloud Computing and Commerce, Dublin City University Business School, Glasnevin Campus, Collins Avenue, Glasnevin, Dublin 9, Ireland. Mail: pierangelo.rosati@dcu.ie.

Acknowledgment: The research work described in this paper was supported by the Irish Centre for Cloud Computing and Commerce, an Irish national Technology Centre funded by Enterprise Ireland and the Irish Industrial Development Authority.

1. Introduction

Recent developments in information and communications technologies have triggered profound changes in the financial services sector. Financial institutions are currently experiencing the effects of a growing adoption of Mobile, Cloud Computing, Big Data, and Social technologies which enable new value networks and business models. International Data Corporation (IDC), one of the leading intelligence companies for information and technology (IT), defines the combination of such technology as the "third-platform" (IDC, 2011). Recent regulatory changes (e.g. Payment Service Directive 2 in the European Union) and the increasing movement towards Open Banking[1], combined with ever growing competition led by innovative startups and technology giants (e.g. Google, Apple, Amazon and Alibaba) have further exacerbated the extent of actual and potential changes in the industry (Brodsky and Oakes, 2017). Exemplar cases include (a) mobile banking which has transformed how the public interact with banks (Gupta, 2013); (b) peer-to-peer lending and crowdfunding which now represents valid alternatives to banks for businesses in need of funding and for investors alike (Lynn et al., 2017; Mac An Bhaird et al., 2017); and (c) technology-enabled services like PayPal, Stripe or Square, impacting how we make payments, both online and offline (Suhuai and Peter, 2010; Mims, 2012). Despite their innovativeness, these technologies still rely on a trusted third party to act as an intermediary and facilitate transactions, for a fee. Bitcoin is different. Bitcoin is system for electronic transactions that explicitly does not rely on trust (Nakamoto, 2008).

While traditional financial systems use intermediaries, such as banks and credit card providers, to authorize and validate transactions, Bitcoin does not. At the same time, traditional currencies rely

[1] Brodsky and Oakes (2017) define Open Banking as "a collaborative model in which banking data is shared through APIs between two or more unaffiliated parties to deliver enhanced capabilities to the marketplace."

on central banks or mints to control currencies both in terms of availability but also to police the double-spending problem monitoring financial intermediaries and the counterfeiting of physical currency. The double-spending problem is particularly problematic for digital currencies where the digital artifact can be copied with greater ease.

Bitcoin was not the first digital currency (Rosati et al., 2016). It was, however, the first to overcome one of main issues of every currency, and for digital currency in particular: the so-called "double-spending problem" – i.e. the possibility to copy the physical or digital token associated with money and spend it multiple times (Chaum, 1983). Bitcoin makes use of complex cryptographic techniques (hence the name cryptocurrency) to secure transactions and guarantee the immutability of the transaction record (Zarafis et al., 2014). Decentralized cryptocurrencies use the power of the crowd to establish a peer-to-peer network and replace a central server's signature with a consensus mechanism based on proof of work to record groups of transactions (block) and link them to the public history of all transactions in what is known as a blockchain (Back et al., 2014; Yli-Huumo et al., 2016). As the peer-to-peer network increases, the blockchain becomes more impractical to corrupt and therefore more secure while at the same time transaction costs are reduced as a result of disintermediation (Nakamoto, 2008).

Bitcoin is both a currency and a system. Both aspects of Bitcoin have attracted a huge amount of attention. As a cryptocurrency, Bitcoin's market cap reached a peak of over US$700bn in January 2018 (Martin, 2018) and analysts report that over 226,000 daily transactions are completed on the bitcoin network with an ever-increasing number of merchants accepting bitcoins as payment (CoinDesk, 2017). Other cryptocurrencies, such as Ethereum, are reaching similar, but still not comparable, valuations and traction; in January 2018, the market capitalization of Ethereum

reached a peak of more than US$120bn (Shin, 2018). At the same time, blockchain[2], the system underlying Bitcoin, has been heralded as one of the most disruptive technologies to hit the financial services sector (WEF, 2016). However, belying the success of Bitcoin is its use for illegal transactions as an anonymous and untraceable payment system and money laundering (Bryans, 2014). These illegitimate practices have caused regulators to question the legitimacy of Bitcoin and to threaten bans (ECB, 2012; Blundell-Wingall, 2014; Interpol, 2017; Nee Lee, 2017; Jung-a and Harris, 2018). Bitcoin's further development and adoption is hindered by its illegitimate use; its initial strengths in decentralization and cryptography are also its Achille's Heel, as achieving widespread legitimation is a critical component in the success of IT innovations (Du and Flynn, 2010).

Lindman et al. (2017) posit that decentralized payment platforms, such as Bitcoin, operate in many-sided markets, and as such their adoption is influenced not just by the primary actors but a wide variety of stakeholders. Similarly, extant research suggests that online social networking sites and online fora are important communities in which information on Bitcoin is shared (Mai et al., 2015). Indeed, research by Mai et al. (2015) suggests social media is an important indicator of future Bitcoin returns and Twitter users; particularly those with higher social influence, have significant short-term impacts on the Bitcoin market (Mai et al., 2015).

This paper explores the usage of Twitter by four discrete actor types over a 12-month period (July 2015 to June 2016) to communicate on the topic of Bitcoin. Our research objectives are threefold. First, we seek to identify the micro-level legitimation strategies used by four social actors in the Bitcoin community. Second, we assess the utility of Twitter datasets for legitimation research, and third we identify avenues for future legitimation research. We apply Kaganer et al.'s (2010) IT

[2] In this paper we refer to "Blockchain" as the Bitcoin blockchain, and to "blockchain" as the technology.

Legitimation Taxonomy to explore the firm-level messaging strategies and patterns used in a dataset of 7,207 tweets generated by 1,107 users (617 firms) over a 12-month period. In doing so, we address calls for research on how the diffusion and adoption of blockchain-based systems unfolds, the role different actors play in the development of such systems, and dynamics between social media and Bitcoin (Du and Flynn, 2010; Lindman et al., 2017).

The remainder of this paper is organized as follows. The next section reviews the existing literature on IT adoption, legitimation of IT, and bitcoin. 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 provide evidence of a current lack of clear communication strategies for building Bitcoin legitimacy. We conclude with a summary of the theoretical and practical implications of this study and identify future avenues for research.

2. Literature Review

2.1 Bitcoin

Digital innovations are described as products, services, or business models, which are enabled by IT, are perceived as new, and require significant changes from adopters (Fichman et al., 2014). Given the increasing adoption, the attention it has gathered from multiple stakeholders, and the fact that Bitcoin departs from the tradition of relying on trusted third parties, its potentially transformative power is apparent. First launched in 2008 by either a coder or by a group of coders under the pseudonym of Satoshi Nakamoto (2008), Bitcoin can be defined as "an open-source peer-to-peer digital currency whose users put trust into the network instead of in a central institution" (Rosati et al., 2016, p.3). The Bitcoin was the first digital currency to overcome the double-spending problem through the implementation of the blockchain technology, which

allowed it to replace the central server's signature with a consensus mechanism (Back et al., 2014). Bitcoins are usually stored in local or online wallets (Brito and Castillo, 2013; Murphy, 2013). Every Bitcoin user has a public and private key; the public key represents the address of a specific Bitcoin wallet and allows other users to send money to it, while the private key is for users' authentication. Each Bitcoin transaction is verified by the network, once it is deemed valid, it is stored in a block; blocks are closed, on average, every ten minutes and linked to previous blocks in order to form the Blockchain. This process, called mining, is based on a protocol called Proof-of-Work, which is one of the main concepts of blockchain technology (Yli-Huumo et al., 2016). Blockchain technology represents the backbone of Bitcoin; its potential applications extend well beyond Bitcoin (CB Insights, 2017). However, despite the significant hype surrounding blockchain and the significant amount of resources spent to explore potential applications, Bitcoin remains the most successful application of this technology (Rosati et al., 2016; Lindman et al., 2017), and the most famous example of digital currency (Ciaian and Miroslava, 2016; Ciaian et al., 2016).

Distrust in financial institutions, particularly following the global financial crisis (Dodd, 2017; Lindman et al., 2017) coupled with calls for frictionless payment systems (Barber et al., 2012) were the main drivers behind the initial development and adoption of Bitcoin. The volume of Bitcoin transactions has grown exponentially over the last few years as well as its market capitalization. While the number of merchants accepting Bitcoin has grown significantly (Cuthberston, 2015), researchers have questioned whether Bitcoin meets the key function of a currency (Mankiw, 2007). Caian and Miroslava (2016) and Ciaian et al. (2016) identify five advantages and nine challenges associated with Bitcoin when compared with traditional currencies, and link them to currencies' functions (Table 1). Their findings suggest that the volatility of Bitcoin price, mostly driven by speculative investments, undermines Bitcoin's wide

adoption. Therefore, Bitcoin, qualifies more as a speculative investment than as a currency (Velde, 2013; Williams, 2014; Yermack, 2014; Caian and Miroslava, 2016; Ciaian et al., 2016).

Table 1. Currency characteristics of Bitcoin (Ciaian and Miroslava, 2016)

Currency Function	Advantage of Bitcoin	Challenges of Bitcoin
Medium of Exchange	Transaction costs Anonymity and privacy Learning spillover effect	• Not legal tender and difficulty to procure Bitcoins • Fixed adoption costs • Network externalities • Dispute resolution not available • Absence of Bitcoin denominated credit
Unit of account	Divisibility	• Relative price comparability problem • Price volatility
Store of value	Non-inflationary supply	• Deflationary pressure • Cyber security

As noted above, another factor undermining Bitcoin's widespread adoption is the tainted reputation it has gained due to its use for unethical or fraudulent purposes (Stokes, 2012; Decker and Roger, 2014). Even though it has been argued that events such the closure of Silk Road, an online platform for selling illegal drugs on the dark web which accepted Bitcoin payments, might have benefitted Bitcoin by boosting its popularity (Yermack, 2014; EBA, 2014); this most likely damaged Bitcoin's reputation and users' trust (Kirby, 2014; Swanepoel, 2016). Previous research shows that users' trust plays a key role in financial services (Ennew et al., 2011; Hansen, 2012), and in the adoption and acceptance of a technology innovation (Pavlou, 2003). Bitcoin represents both a financial and technological innovation. As such, restoring the reputation of Bitcoin may represent a key enabler for a wider adoption.

Rosati et al. (2016) adopts social media, and Twitter specifically, to investigate the actors involved and the topics being discussed in Twitter discourse around blockchain and Bitcoin. Their findings reveal that most of tweets on Bitcoin originated from untrustworthy actors encouraging the use of Bitcoin in games or for gambling; they also provide evidence of the use of social media bots which are usually associated with information manipulation. Based on this evidence, the authors highlight

the need for building legitimacy around blockchain and Bitcoin applications to increase consumers' trust and incentivize adoption. The authors also call for further research exploring the current legitimation efforts or strategies adopted by different stakeholders in the blockchain and bitcoin ecosystem. With this paper, we respond to this call and investigate which legitimation strategies (if any) are adopted by financial services, media, consulting and IT companies to build Bitcoin legitimacy.

2.2 Technology Adoption and Diffusion

Technology adoption is considered one of the most developed research streams within the information systems literature. There exists a wealth of theoretical frameworks from Diffusion of Innovation theory (DOI) (Rogers, 2003) to Technology Acceptance Model (TAM) (Davis, 1989), and Human-Organization-Technology fit (HOT-fit) (Yusof and Kuljis, 2008). These theories have been applied to understand technology adoption at an individual end user and an organizational level across an array of contexts and industries, with a tendency to focus either on the characteristics of the technology or adopting organization (Rodón and Sesé, 2010) or the characteristics and perceptions of the adopter. This body of literature has greatly advanced understanding of technology adoption as documented in various literature reviews (Tornatzky and Fleischer, 1990; Prescott and Conger, 1995; Fichmam, 2000; Venkatesh et al., 2003), and provides important insights for how and when to innovate with IT (Swnason and Ramiller, 2004). While technology adoption models sustain their relevance in this context for exploring adoption decisions at the individual level, in decentralized ecosystems such as Bitcoin, there is need to explore such dynamics from a broader community and inter-organizational perspective. At this early stage of diffusion, the success of Bitcoin is largely reliant on generating positive interest from a diverse array of organizations (Wang and Swanson, 2007), which can be referred to as the Bitcoin

community. This paper explores the discourse within the community on Twitter adopting the lens of organizing visions, according to which the social system both shapes and employs a vision of a new innovation which is crucial to its success (Swanson and Ramiller, 1997). Organizing visions aid within a community help to (a) interpret the nature of the innovation, (b) legitimize adoption, and (c) mobilize the market to adopt the innovation, which together can increase adoption at all stages of diffusion (Swanson and Ramiller, 1997).

Leveraging the organizing visions lens, Kaganer et al. (2010) developed the IT Legitimation Taxonomy for understanding the strategies leveraged by stakeholders to legitimize an innovation across four types of legitimacy i.e. cognitive, pragmatic, normative and regulative. The enduring questions surrounding the legitimacy of Bitcoin necessitate research efforts to understand how organizations within the community utilize legitimation strategies to add clarity around the interpretation of Bitcoin, legitimize its adoption, and mobilize the market to adopt.

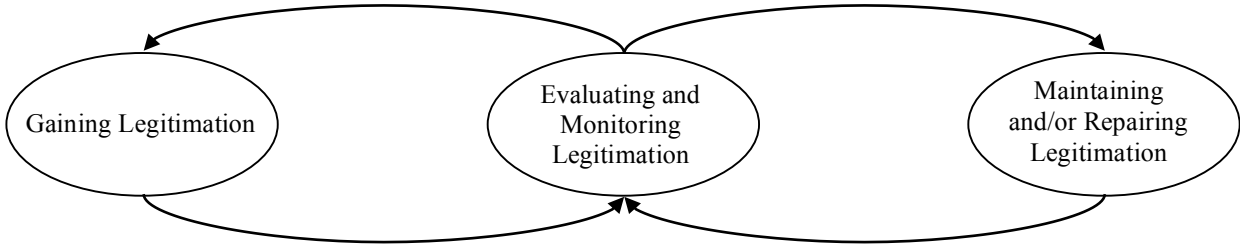
3. Theoretical Background

Legitimation research seeks to understand the rationale behind decisions to adopt or reject IT innovations (Hirscheim and Klein, 1989). In line with Suchman (1995, p.574), we view legitimacy as "[…] 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." Within this definition, we consider four types of legitimacy; (a) Cognitive legitimacy or the diffusion of knowledge within the community about the innovation (Aldrich, 1994), which is achieved through comprehensibility and taken-for-grantedness (Suchman, 1995), (b) Pragmatic legitimacy which is based on the self-interest and utility to the organization's stakeholders (Suchman, 1995), (c) Normative legitimacy seeks to align the innovation with moral rightness (Suchman, 1995), and (d)

Regulative legitimacy which seeks to align the innovation with legal best practice (Kaganer et al., 2010).

In order to explore legitimation efforts within a community, Flynn and Hussain (2004) developed the Legitimation Activity Model (LAM), a seven-staged cyclical model to explain the interplay between legitimation seekers and legitimation providers. While the LAM was conceptualized as a firm-level framework, it can 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 Bitcoin 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 addition, to further understand the legitimation efforts of key actors in greater detail, we adapt the IT Legitimation Taxonomy. Developed by Kaganer et al. (2010), this taxonomy enables the grouping of 26 micro legitimation strategies in accordance with the four types of legitimation they represent. The IT Legitimation Taxonomy enables the exploration of legitimation building the first stage of ILAM, within the broader lens of organizing visions. Table 2 illustrates the IT

Legitimation Taxonomy. This study seeks to extend and explore the applicability of this taxonomy and the wider organizing visions lens to the Bitcoin context and ascertain which of the 26 strategies organizations are pursuing.

Table 2. IT Legitimation Taxonomy (Kaganer et al., 2010)

Code	Strategy	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.

Table 2. IT Legitimation Taxonomy (Kaganer et al., 2010) – Continued from previous page.

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

4. Research Design

Our study focuses on how the media, IT, financial services, and consulting firms use Twitter to build legitimation around Bitcoin. These organizations are deemed important stakeholders in the Bitcoin community. The media is selected as it provides a measure of organizational legitimacy and can affect perceptions of legitimacy in a positive or negative way (Elsbach, 1994; Baum and Powell, 1995). The financial services and IT sectors are selected as Bitcoin is a financial innovation with a significant technology component, thus organizations within these industries are invested in its success (Miles, 2017). Finally, consulting firms are included as they act as they typically act as knowledge brokers in the context of innovation adoption both in the online and offline world (Sutton 2002; Hargadon 2003).

Our analysis focuses on Twitter discourse relating to Bitcoin over the 12-month period from 1 July 2015 to 30 June 2016. We retrieved all English-language tweets containing the hashtags #bitcoin and/or the keyword 'bitcoin' using the GNIP API. GNIP data included the text of messages, time-stamp, user, geographical location, URLs (Uniform Resource Locators), and whether a message was an original tweet, a retweet or a reply. We also retrieved Klout Score[3], a measure of users' influence, from the Klout Score API. The initial dataset comprised 11,956,529 tweets from 368,213 Twitter accounts, of which 9,291,748 (77.7 percent) were original posts, 199,939 were

[3] Klout Score ranges from zero to 100 and is based on three components across nine different social media platforms: (i) true reach, i.e. how many people a user influences; (ii) amplification, i.e. how much the user influences them; and (iii) network impact, i.e. the influence of the user's network (Edwards et al., 2013; Rao et al., 2015).

replies (1.7 percent) and 2,664,781 (22.3 percent) retweets. The dataset was refined to include only original posts from verified accounts and from accounts with a Klout Score of 75 or higher. The remaining accounts were manually filtered to include only media, IT, financial services and consulting firms. The final dataset comprised 7,207 tweets from 1,107 Twitter accounts (617 firms). Table 3 outlines the 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, namely P1 and P2 in Table 1 were adapted for 'quality of service' rather than 'quality of medical care'. Two independent coders interpreted the content of each tweet and classified each message into one of the 26 categories in the taxonomy or as 'Other' if a clear legitimation strategy did not emerge. An inter-rater reliability with a Kappa coefficient of 0.78 and a Cronbach's Alpha of 0.88 was achieved. Data was analyzed for two types of patterns in the use of legitimation strategies on Twitter: (a) overall use of legitimation strategies, and (b) use of legitimation strategies by target actor.

Table 3. Number of Accounts and Firms by Actor Type

Type	No. of Accounts	No. of Firms
Media	874	434
IT	130	103
Financial Services	76	64
Consulting	27	16
Total	1,107	617

5. Analysis and Findings

Figure 2 illustrates the percentage of tweets for each of the micro-level legitimation strategies presented above. It clearly emerges that a significant percentage (36.56 percent) of the tweets in our dataset were not associated with any legitimation strategy. C7 (Diffusion Organizational), P13 (Alliance Field Level Actor), and N2 (Normative – Transformational) were the most adopted strategies, which together accounted for almost 25 percent of the tweets in our dataset. Specifically,

9.60 percent of the tweets aimed to build cognitive legitimacy by emphasizing the increasing diffusion and ongoing development of Bitcoin (C7). These tweets were mostly related to (a) political endorsements, (b) technology improvements, and (c) an increase in number of transactions.

8.44 percent of the tweets were associated with attempts to build pragmatic legitimacy by raising awareness of alliances between influential actors in the Bitcoin ecosystem (P13); such actors were mostly financial services and technology companies, and regulators. However, it is worth noting that part of the alliances focused on the blockchain technology (e.g. "IBM is becoming the biggest backer of a technology that underpins Bitcoin.") and not the Bitcoin per se. Finally, 6.76 percent of the tweets focused on the extent of changes Bitcoin triggers (N2); these tweets highlighted the potential disrupting effects of Bitcoin and demonstrate the importance of adopting IT innovations to adapt to potential changes in the business environment (Kaganer et al., 2010).

Attempts to build normative legitimacy are unusual for IT innovations, for which actors tend to prefer cognitive and pragmatic legitimacy (Kaganer et al., 2010). However, Bitcoin also encompasses ethical and societal aspects (Dodd, 2017) and this finding provides further confirmation that Bitcoin is more than a mere technology or financial innovation. Finally, it is worth noting that only a small percentage (2.59 percent) of the tweets were associated with regulative legitimacy. This might be a reflection of the fact that Bitcoin is still essentially an unregulated environment, and that regulators around the world tend to keep a wait-and-see position (Ciaian and Miroslava, 2016). Table 4 provides examples of tweets by legitimacy type.

Figure 2. Micro-Legitimation Strategies Used

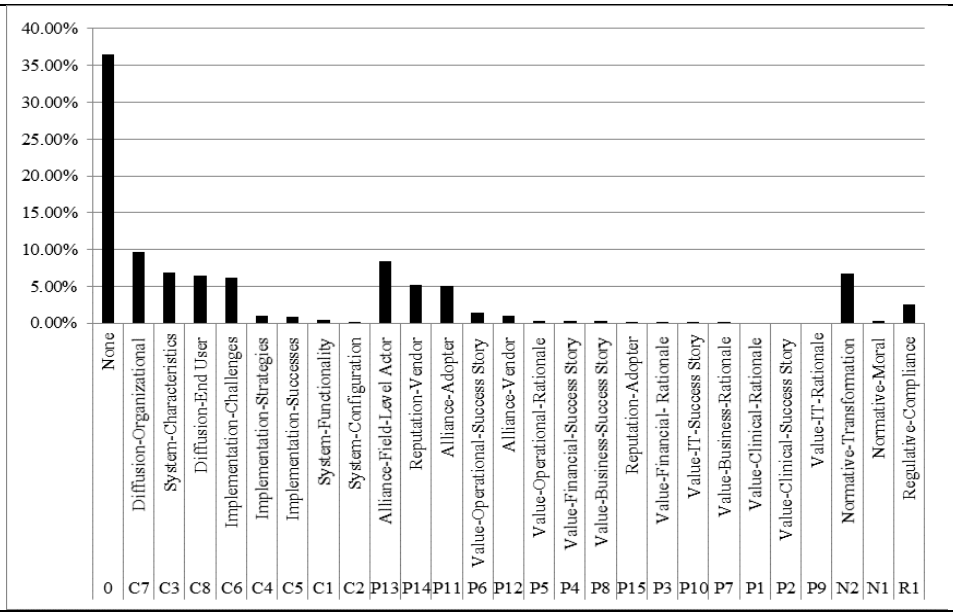


Table 4. Sample Tweets

Type	Example
Pragmatic	• Goldman Sachs put $50 million into bitcoin startup Circle and now it's coming to Europe http://t.co/rpUILUvoQ2 http://t.co/viPufo8nTw • Barclays Becomes First Big U.K. Bank To Accept Bitcoin http://t.co/dMgs9AFXOh • Big names including Bain Capital and Mastercard are backing Barry Silbert's bitcoin venture https://t.co/BFQa39ORLk
Cognitive	• Banks could use bitcoin technology by next year https://t.co/zvjRl3OOfw • Winklevoss twins' bitcoin firm sees trading surge https://t.co/iaTIR2nOg6 • How virtual currency #Bitcoin in gaining ground in #India http://t.co/XZ4HwS9W79
Normative	• Bitcoin to be major reserve currency by 2030: Research https://t.co/kZZFpmVYvV • #Bitcoins: possibly the #future of money. Find out how to purchase them on @businessinsider:https://t.co/ooNrnxPGWf • A star Silicon Valley entrepreneur explains how bitcoin is going to change the world https://t.co/A3OjFmWB3P
Regulative	• No VAT on Bitcoin, rules ECJ, but capital gains still apply https://t.co/YTZTdCmqFe • EU court rules that @Bitcoin exchanges don't have to pay taxes https://t.co/Gs5fPxKR3c A

As shown in Table 5, media companies are the most represented with 874 accounts. This is not surprising considering the attention they pay to Bitcoin (Glaser et al., 2014). However, with 6.81 tweets per user, they are only the second most active group, outpaced by Financial services firms

with who average 10.04 tweets per user. Financial services firms, despite a lower presence than media and IT companies, show significant involvement in the Bitcoin discussion. IT companies are the least active (2.84 tweets per user). Finally, consulting companies are the least represented (27 users) with 4.52 tweets per user. Taken together, these findings suggest that Bitcoin is considered more a financial than a technology innovation since it triggers significantly higher interest among financial services firms. The analysis of micro-level legitimation strategies reveals that only media and financial services companies pursued pragmatic legitimation (P13), and normative legitimacy was not the main focus of financial services firms. All actors were concerned with cognitive legitimacy, but with different preferences. While C7 was common to all actors, IT firms showed greater interest in end user diffusion (C8), while financial services and consulting firms focused on system characteristics (C3).

Table 5. Micro-Level Strategies by Actor Type

Company	Descriptive		Code	# Tweets
Media	Tot. No. of tweets	5953	None	2092
	No. of users	874	C7	556
	Avg. User Activity	6.81	P13	543
			N2	414
IT	Tot. No. of tweets	369	None	179
	No. of users	130	C7	33
	Avg. User Activity	2.84	C8	30
			N2	27
Finance	Tot. No. of tweets	763	None	339
	No. of users	76	C7	93
	Avg. User Activity	10.04	C3	64
			P13	48
Consulting	Tot. No. of tweets	122	C3	49
	No. of users	27	None	25
	Avg. User Activity	4.52	C7	10
			N2	9

6. Contribution

In line with our three research objectives, this paper answers the call for research which can offer insights on the acceptance and diffusion of Bitcoin (Lindman et al., 2017). To do so, we leverage an inter-organizational perspective to extend IT innovation to a new focus on the broader Bitcoin community. The data set includes 617 firms across the four actor types i.e. media, IT, financial services and consulting firms. Findings show that there are a greater number of media and IT firms engaging in legitimation discourse related to Bitcoin on Twitter but financial service 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 Bitcoin and acknowledges the important roles that a diverse range of organizations can play in achieving its legitimation (Brandt, 2014).

The paper advances IS and Bitcoin research further 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) and supports the extension of the IT Legitimation taxonomy to the Bitcoin and indeed broader financial innovation context. The paper provides insights into the types of legitimation strategies utilized by the four actor types. Surprisingly, the largest portion of the tweets were not associated with any legitimation strategies suggesting that firms lack of either a clear communication strategy. The intuition of a potential lack of a clear communication strategy is further supported by a similar distribution of other tweets across other types of legitimation strategies i.e. cognitive, pragmatic and normative. However, such results are mostly driven by media companies, with IT, financial services and consulting firms paying more attention to build cognitive legitimacy by emphasizing Bitcoin adoption and system characteristics. 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 Swanson and Ramiller (2004) and Kaganer et al. (2010) respectively. The findings clearly illustrate the value of leveraging this taxonomy to understand the differing micro-level legitimation strategies used by key actors to legitimize Bitcoin on Twitter.

Third and relatedly, the paper builds on recent work (Mai et al., 2015) which leverages Twitter data to explore the role of discourse on Bitcoin prices, and extends the use of Twitter to understand legitimation efforts of established firms invested in the future of Bitcoin. This represents a methodological advance for legitimation research which has a legacy of relying on single case studies. We argue that social media data represents a novel and reliable source of data for understanding efforts to build legitimation. While existing studies, which utilize case study approaches, have yielded important 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 support the use of the Integrated Legitimation Activity Model to understand legitimation among a community of key actors.

The research also has practical implications for those seeking to legitimize Bitcoin and IT innovations more generally using Twitter. A relatively small number of micro-level strategies are used by firms and emphasize cognitive and pragmatic forms of legitimacy. For both innovation entrepreneurs and their social media operators, the IT Legitimation Taxonomy presents a host of useful micro-strategies they may seek to leverage to achieve the legitimation of Bitcoin. The

findings illustrate the key actors actively engage in Bitcoin legitimation discourse to help interpret this complex innovation and mobilize the market to adopt.

7. Limitations and Future Research

There are several limitations to our research which illuminate areas ripe for further investigation. Our study is limited to one innovation, social network, one year and four specific actors. Further research might include temporal legitimation analysis over several years (rather than just one year), cross-sectional and comparative legitimation pattern analysis across different actors, innovations (e.g. blockchain or other financial technologies) and networks, and using other qualitative and quantitative techniques e.g. network analytics, text mining or interviews. As Bitcoin is not merely a currency and a system but a form of social movement, it lends itself to interrogation through a variety of theoretical lenses. We hope these suggestions encourage both information systems and finance researchers to further engage in multidisciplinary projects exploring the potential of Bitcoin and legitimation.

8. Conclusion

Bitcoin represents a financial and technological innovation with transformative power. Despite huge success to date, its legitimacy has been questioned by media firms and regulators. The future of Bitcoin hinges on achieving legitimation and mobilizing adoption. This study couples the organizing visions lens with the IT Legitimation taxonomy to explore the legitimation strategies utilized by four actor types in the Bitcoin community. The next stage of this research will compare the legitimation strategies of key actors within the Bitcoin community to those in the Blockchain community. This work will focus on the latter stages of ILAM through an evaluation of existing

strategies and the presentation of recommendations for maintaining and repairing legitimation in this context.

References

Aldrich, H. E. and Fiol, C. M. (1994). "Fools Rush In - The Institutional Context of Industry Creation." *Academy of Management Review* 19(4), pp. 645-670.

Back, A., Corallo, M., Dashjr, L., Friedenbach, M., Maxwell, G., Miller, A., Poelstra, A., Timón, J. and Wuille, P. (2017). "Enabling blockchain innovations with pegged sidechains." Available at: http://www. opensciencereview. Accessed 2 May 2017.

Barber, S. Boyen, X., Shi, E., and Uzun, E. (2012). "Bitter to better—how to make bitcoin a better currency." *International Conference on Financial Cryptography and Data Security*, pp. 399-414.

Baum, J. A. C. and Powell, W. W. (1995). "Cultivating an institutional ecology of organizations: Comment on Hannan, Carroll, Dundon, and Torres." *American Sociological Review* 60(4), pp. 529-538.

Blundell-Wignall, A. (2014). "The Bitcoin question: Currency versus trust-less transfer technology." OECD Working Papers on Finance, Insurance and Private Pensions. Available at: https://www.oecd.org/daf/fin/financial-markets/The-Bitcoin-Question-2014.pdf. Accessed May 2017.

Brandt, C. J. (2014). "Toward a Process View in Adoption of Interorganizational Information Systems." *Proceedings of the 37th Information Systems Research Seminar in Scandinavia*.

Brito, J. and Castillo, A. (2013). "Bitcoin: a primer for policymakers." Mercatus Center, George Mason University.

Brodsky, L. and Oakes, L. (2017). "Data sharing and open banking". McKinsey & Company. Available at: https://www.mckinsey.com/industries/financial-services/our-insights/data-sharing-and-open-banking. Accessed 12 January 2018.

Bryans, D. (2014). "Bitcoin and money laundering: mining for an effective solution." *Indiana Law Journal*, 89 (1), pp 441-472.

CB Insights (2017). "Banking Is Only The Start: 27 Big Industries Where Blockchain Could Be Used." Available at: https://www.cbinsights.com/blog/industries-disrupted-blockchain/. Accessed 10 June 2017.

Chaum, D. (1983). "Blind signatures for untraceable payments." *The Advances in cryptology*.

Ciaian, P. and Miroslava, R. (2016). "The digital agenda of virtual currencies: Can BitCoin become a global currency?." *Information Systems and e-Business Management*, 14(4), pp. 883-919.

Ciaian, P. Miroslava, R. and d'Artis K. (2016). "The economics of BitCoin price formation." *Applied Economics*, 48(19), pp. 1799-1815.

CoinDesk (2017). "State of Blockchain 2017." Available at: http://www.coindesk.com/research/state-of-blockchain-q4-2016/. Accessed May 2017.

Cuthbertson, A. (2015). "Bitcoin Now Accepted by 100,000 Merchants Worldwide." International Business Times, Available at: www.ibtimes.co.uk/bitcoin-now-accepted-by100000-merchants-worldwide-1486613. Accessed 22 May 2017.

Davis, F. D. (1989). "Perceived usefulness, perceived ease of use, and user acceptance of information technology." *MIS Quarterly*, pp. 319-340.

Decker, C. and Roger, W. (2014). "Bitcoin transaction malleability and MtGox." *European Symposium on Research in Computer Security*, Springer International Publishing.

Dodd, N. (2017). "The social life of Bitcoin." *Theory, Culture & Society*, 0(0), pp. 1-22.

Du, Y. and Flynn, D. (2010). "Exploring the legitimation seeking Activities in an Information System Project." *Proceedings of the International Conference on Information Systems*.

Edwards C, Spence P, Gentile C, Edwards A and Edwards A (2013). "How much Klout do you have...A test of system generated clues on source credibility." *Computers in Human Behavior*, 13, A12-A16.

Elsbach, K. D. (1994). "Managing organizational legitimacy in the California cattle industry: The construction and effectiveness of verbal accounts." *Administrative Science Quarterly*, pp. 57-88.

Ennew, C. Kharouf, H. and Sekhon, H. (2011). "Trust in UK financial services: A longitudinal analysis." *Journal of Financial Services Marketing*, 16(1), pp.65-75.

European Banking Authority (EBA) (2014). "EBA opinion on 'virtual currencies'." EBA/Op/2014/08, European Banking Authority.

European Central Bank (ECB) (2012). "Virtual currency schemes." Available at: https://www.ecb.europa.eu/pub/pdf/other/virtualcurrencyschemes201210en.pdf. Accessed 10 March 2017.

Fichman, R. G. (2000). "The diffusion and assimilation of information technology innovations." Framing the domains of IT management: Projecting the future through the past, Cincinnati, OH: Pinnaflex Educational Resources, Inc., pp. 1-42

Fichman, R. G., Dos Santos, B. L., and Zheng, Z. (2014). "Digital Innovation as a Fundamental and Powerful Concept in the Information Systems Curriculum." *MIS Quarterly*, 38 (b), pp. 329-353.

Flynn, D., and Du, Y. (2012). "A case study of the legitimation process undertaken to gain support for an information system in a Chinese university." *European Journal of Information Systems* 21(3), pp. 212-228.

Flynn, D., and Hussain, Z. (2004). "Seeking legitimation for an information system: a preliminary process model." *European Conference on Information Systems*.

Glaser, F., Zimmermann, K., Haferkorn, M., Weber, M. C., and Siering, M. (2014). "Bitcoin - Asset or Currency? Revealing Users' Hidden Intentions." *European Conference on Information Systems*.

Gupta, S. (2013). "The mobile banking and payment revolution." *European Financial Review*, 2, pp. 3-6.

Hansen, T. (2012). "Understanding Trust in Financial Services. The Influence of Financial Healthiness, Knowledge, and Satisfaction." *Journal of Service Research*, 15(3), pp. 280-295.

Hargadon, A. (2003). "How breakthroughs happen. The surprising truth about how companies innovate." Boston, MA: Harvard Business School Press.

Hirschheim, R. and Klein, H. K. (1989). "Four paradigms of information systems development." *Communications of the ACM*, 32(10), pp. 1199-1216.

International Data Corporation (IDC) (2011). "IDC Predictions 2012: Competing for 2020." IDC #231720.

Interpol (2017). "Digital currencies and money laundering focus of INTERPOL meeting." Available at: https://www.interpol.int/en/News-and-media/News/2017/N2017-002. Accessed 11 May 2017.

Jung-a, S. and Harris, B. (2018). "Bitcoin tumbles as South Korea plans trading ban." Financial Times. Available at: https://www.ft.com/content/0d5ff7d4-f67d-11e7-88f7-5465a6ce1a00. Accessed 12 January 2018.

Kaganer, E., Pawlowski, S. D., and Wiley-Patton, S. (2010). "Building legitimacy for IT innovations: the case of computerized physician order entry systems." *Journal of the Association for Information Systems*, 11(1), pp. 1-33.

Kirby, P. (2014). "Virtually Possible: How to Strengthen Bitcoin Regulation Within the Current Regulatory Framework." *North Caroline Law Review*, 93, p. 189-221.

Lindman, J., Rossi, M. and Tuunainen, V.K. (2017). "Opportunities and risks of Blockchain Technologies in payments – a research agenda." *Proceedings of the 50th Hawaii International Conference on System Science*.

Lynn, T., Kilroy, S., van der Werrf, L., Venkatagiri, S., Healy, P. (2015). "Towards a General Framework for Social Media Research Using Big Data." *Proceedings of Procomm 2015: IEEE Professional Communication Conference*.

Lynn, T., Rosati, P., Nair, B. and Mac An Bhaird, C. (2017). "Harness the Crowd: An Exploration of the #Crowdfunding Community on Twitter". ISBE Annual Meeting 2017, Belfast.

Mac An Bhaird, C., Rosati, P., Cummins, M., and Lynn, T. "The financial wisdom of the crowd in peer to peer lending." RENT XXXI, Lund University.

Mai, F., Bai, Q., Shan, Z., Wang, X.S. and Chiang, R.H. (2015). "The Impacts of Social Media on Bitcoin Performance." *Proceedings of the Thirty Sixth International Conference on Information Systems*.

Martin, W. (2018). "The global cryptocurrency market hit a new record high above $700 billion". Available at: http://uk.businessinsider.com/bitcoin-price-global-cryptocurrency-market-capitalisation-january-3-2018-1. Accessed 12 January 2018.

Mankiw, N. G. (2007). "Macroeconomics. 6th ed." Worth Publishers, New York.

Murphy, R. P. (2013). "The economics of BitCoin". Library of Economic Liberty. Available at: http://www.econlib.org/library/ Columns/y2013/MurphyBitCoin.html. Accessed 10 May 2017.

Nakamoto, S. (2008). "Bitcoin: A peer-to-peer electronic cash system." Available at: https://bitcoin.org/bitcoin.pdf. Accessed 10 May 2017.

Nee Lee, Y. (2017). "From China to Singapore, Asian countries are increasingly uneasy with the rise of bitcoin." Available at: https://www.cnbc.com/2017/12/22/bitcoin-china-singapore-japan-issue-cryptocurrency-warnings.html. Accessed 12 January 2018.

Nims, C. (2012). "How Universal One-Click Payments Will Change Everything". *MIT Technology Review*. Available at: https://www.technologyreview.com/s/428511/how-universal-one-click-payments-will-change-everything/. Accessed 12 January 2018.

Pavlou, P. A. (2003). "Consumer acceptance of electronic commerce: Integrating trust and risk with the technology acceptance model." *International Journal of Electronic Commerce*, 7(3), pp. 101-134.

Prescott, M.B. and Conger, S.A. (1995). "Information Technology Innovations: A Classification by IT Locus of Impact and Research Approach." *ACM SIGMIS Database*, 26(2-3), pp.20-41.

Rao A, Spasojevic N, Li Z and Dsouza T (2015). "Klout Score: Measuring influence across multiple social networks." *IEEE International Conference on Big Data*.

Rodón, J. and Sesé, F. (2010). "Analysing IOIS Adoption Through Structural Contradictions." *European Journal of Information Systems*, 19(6), pp.637-648.

Rogers, E.M. (2003). "Diffusion of Innovations, 3rd Ed.". New York: Free Press, New York, NY, USA.

Rosati, P., Nair, B., and Lynn, T. (2016). "#Bitcoin vs #blockchain: An Exploratory Study on the Bitcoin and Blockchain Discourse on Twitter." *Proceedings of the 7th European Business Research Conference*.

Shin, L. (2018). "Vitalik Buterin, Creator Of Ethereum, On The Big Guy Vs. The Little Guy." Forbes. Available at: https://www.forbes.com/sites/laurashin/2018/01/09/vitalik-buterin-creator-of-ethereum-on-the-big-guy-vs-the-little-guy/#1aecb76c4ca7. Accessed 12 January 2018.

Stokes, R. (2012). "Virtual money laundering: the case of Bitcoin and the Linden dollar." *Information & Communications Technology Law*, 21(3), pp. 221-236.

Suchman, M. C. (1995). "Managing Legitimacy: Strategic and Institutional Approaches." *Academy of Management Review*, 20(3), pp.571-610.

Suhuai, L., and Peter, S. (2010). "Consumer acceptance of mobile payments: An empirical study." *4th International Conference on New Trends in Information Science and Service Science* (NISS), pp. 533-537. IEEE.

Sutton, R. (2002). "Weird ideas that spark innovation." *Sloan Management Review*, 43(2), pp. 83–87.

Swanepoel, M. (2016). "Why Bitcoin's Bad Reputation is in the Eye of the Beholder." Coindesk. Available at: http://www.coindesk.com/bitcoin-bad-reputation/. Accessed 12 January 2018.

Swanson, E.B. and Ramiller, N.C. (1997). "The Organizing Vision in Information Systems Innovation." *Organization Science*, 8(5), pp.458-474.

Swanson, E. B. and Ramiller, N. C. (2004). "Innovating Mindfully with Information Technology." *MIS Quarterly* 28(4), pp. 553-583.

Tornatzky, L. and Fleischer, M. (1990). "The Process of Technology Innovation." Lexington, MA: Lexington Books.

Velde, F. R. (2013). "Bitcoin: a primer." Chicago Fed Letters No. 317, The Federal Reserve Bank of Chicago.

Venkatesh, V., Morris, M.G., Davis, G.B. and Davis, F.D. (2003). "User acceptance of information technology: Toward a unified view." *MIS Quarterly*, 27(3), pp.425-478.

Wang, P. and Swanson, E. B. (2007). "Launching Professional Services Automation: Institutional Entrepreneurship for Information Technology Innovations." *Information & Organization*, 17(2), pp. 59-88.

Williams, M. T. (2014). "Virtual currencies—Bitcoin risk." Paper presented at the World Bank Conference, Washington, DC.

World Economic Forum (WEF) (2016). "The future of financial infrastructure: An ambitious look at how blockchain can reshape financial services." Available at: http://www3.weforum.org/docs/WEF_The_future_of_financial_infrastructure.pdf. Accessed 12 June 2017.

Yermack D. (2014). “Is bitcoin a real currency? An economic appraisal.” NBER Working Paper No. 19747, National Bureau of Economic Research. Available at: http://www.nber.org/papers/w19747. Accessed 12 January 2018.

Yli-Huumo, J., Ko, D., Choi, S., Park, S. and Smolander, K. (2016). “Where Is Current Research on Blockchain Technology? A Systematic Review.” *PloS one*, 11(10).

Yusof, M.M., Kuljis, J., Papazafeiropoulou, A. and Stergioulas, L.K. (2008). “An Evaluation Framework for Health Information Systems: Human, Organization and Technology-Fit Factors (HOT-fit).” *International Journal of Medical Informatics*, 77(6), pp.386-398.

Zarifis, A., Efthymiou, L., Cheng, X. and Demetriou, S. (2014). “Consumer trust in digital currency enabled transactions.” *International Conference on Business Information Systems*, Springer International Publishing, pp. 241-254.