“My Precious!”: A Values-Affordances Perspective on the Adoption of Bitcoin

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Abstract

Given the growing pervasiveness of information systems (IS) in everyday life, recent research has acknowledged that IS technologies are often not value free but are instead infused with fundamental personal values. However, little is known about how such values explain why people assimilate these technologies and their affordances. In the intriguing case of Bitcoin, personal values—especially libertarian political values—have played an essential role in clarifying the ideological underpinnings of Bitcoin and its early adoption. Consequently, we draw on research on personal values and affordance theory to develop and test a model explicating how these personal values guide individuals toward using IS applications whose salient affordances address their values. Specifically, we hypothesize and test how individuals’ personal values (i.e., libertarian political values) influence their attitudes toward Bitcoin affordances and their Bitcoin use behavior using data from a multiple administration survey of 236 users and nonusers of Bitcoin. Our results indicate that libertarian political values affect individuals’ attitudes toward Bitcoin affordances, which in turn mediate the effects of these values on actual Bitcoin use. Our findings advance the field by demonstrating the importance of integrating values into the conceptualization of IS technology affordances.

Keywords: Bitcoin, Blockchain, Values, Political Values, Personal Values, Affordances, Affordance Theory, Individual Use

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1 Introduction

> *[Bitcoin] is very attractive to the libertarian viewpoint if we can explain it properly.* (Nakamoto, 2008a)

This statement by Satoshi Nakamoto, the pseudonym of the person or group who created Bitcoin, has received preliminary support from research on early Bitcoin users (e.g., Bashir et al., 2016; Golumbia, 2016; Karlstrøm, 2014). Specifically, research has suggested that libertarian attitudes were present among the early adopters of Bitcoin (Bashir et al., 2016; Bohr & Bashir, 2014), indicating that political orientation may play a role in shaping use behavior (for related discussions and empirical findings, see Golumbia, 2016; Lawrence & Mudge, 2019). Indeed, differing from many other technologies, the affordances of Bitcoin—a distributed peer-to-peer system enabling the use of a decentralized digital currency (Antonopoulos, 2018)[1]—emerged from the fact that "political values are very literally coded into the [Bitcoin] software itself" (Golumbia, 2016, p. 102). For instance, the Bitcoin affordance of decentralized self-reliance caters to a libertarian mindset because it allows a person to be his or her own bank without the need for a trusted third party (e.g., a bank), thus potentially empowering the individual through a new decentralized governance paradigm (Atzori, 2017; Beck et al., 2018). Consequently, Bitcoin is not a "value-free" technology. Rather, it provides affordances that appeal to individuals with a certain set of values, which have in turn given rise to an entirely new blockchain-based ecosystem within 10 years (Tumasjan, 2021).

Prior information systems (IS) research on values and IS adoption has argued that people are more likely to use a technology when their prioritized values align with the values embedded in the technology (Leidner & Kayworth, 2006; Salcedo & Gupta, 2021; Tams et al., 2020). This

[1] Similar to the convention of other IS studies (Ilk et al., 2021), we use Bitcoin (capitalized) to refer to the system and the underlying blockchain technology and bitcoin(s) (lowercase) to refer to the native transaction token(s) as a unit of currency (BTC).

logic is reflected in the concept of affordances, which describe the prompting character of objects (e.g., a technology) for individuals due to "the opportunities individuals see when they look at objects" (Strong et al., 2014, p. 71). In other words, by their nature, affordances "prompt" individuals to take certain actions. Affordances have received increasing attention in IS research as a fresh lens for examining IS adoption (e.g., Karahanna et al., 2018; Leidner et al., 2018; Strong et al., 2014) because they explain how certain functionalities of a technology can cater to a specific set of users' personal values (i.e., broad motivational goals underlying individuals' attitudes that serve as guiding principles in their lives; Schwartz, 1992) (Cheikh-Ammar, 2018).

However, we currently lack an understanding of (1) how individuals' values guide what affordances they believe a technology can offer them and (2) how the relationship between values and affordances motivates actual technology use. In this vein, we submit that personal values can serve as an important component of theories on affordances and use behavior given the growing pervasiveness of IS in everyday life (Cheikh-Ammar, 2018; Tams et al., 2020). Understanding the link between values and affordances contributes to bridging the conceptual gap between individuals' attitudes toward and use of technologies and their basic goals, as called for by extant affordance research (Cheikh-Ammar, 2018). Our study addresses this gap by theorizing on and empirically testing the values-affordances (VA) link to explain why people assimilate technologies with certain affordances. To do so, we explore the following research question:

RQ: How do individuals' values affect their attitudes toward Bitcoin affordances and their Bitcoin use behavior?

To answer this research question, we take an integrative theory-based approach to develop our logic of the VA link for Bitcoin use behavior. Specifically, we integrate research on personal political values to provide a sociotechnical lens through which we hypothesize and test (1) the direct effects of individuals' personal values (i.e., libertarian political values) on

Bitcoin affordances and (2) the indirect effects of individuals' personal values on their Bitcoin use behavior mediated by these affordances.

Our study makes three important contributions to the literature. First, we contribute to the theoretical discourse linking values to the materiality of information technology (IT) (Cheikh-Ammar, 2018; Markus & Silver, 2008; Snyder et al., 2016) by theorizing on the origin of affordances and how affordances emerge from IT artifacts and values. Specifically, previous information systems (IS) research has focused on the concept of functional affordances (Markus & Silver, 2008), elaborating on the artifacts and features that give rise to affordances (e.g., Grgecic et al., 2015; Karahanna et al., 2018). We enrich this current discourse with a values-oriented perspective of affordances by integrating personal values as antecedents of individuals' attitudes toward technology affordances. We propose and demonstrate that a values-oriented perspective helps explain differences in the importance of affordances across individuals. Thus, we extend affordance research by showing why and how affordances emerge from both artifacts and values (Whetten, 1989). In addition, studies have recently been criticized for confusing the concept of functional affordances with that of technology use, which has led to ambiguity about how and why technology use provides affordances that address individuals' goals and values (Leidner et al., 2018). By focusing on the values-oriented perspective of affordances instead of the technical function-oriented perspective, we directly address this criticism and provide clarity on how affordances evoke subjective attitudes toward them that go beyond the objective view of general functions.

Second, we contribute to the conversation on how values affect technology use (Salcedo & Gupta, 2021; Srite & Karahanna, 2006; Tams et al., 2020) by theorizing on the mediating mechanism of affordances linking values and technology use behavior. While extant research has often argued that values have direct effects on technology use (e.g., Peterson et al., 2010; Salcedo & Gupta, 2021), we advance the field by theorizing on the affordance-related mechanism in the values-use relationship. In this vein, the theoretical VA lens we propose may

serve as a blueprint for values-based IS adoption research to examine why people use technologies based on affordances that cater to their sets of values. Moreover, our study addresses recent calls for research on the effects of personal values (e.g., personal political values) on IS adoption (Baskerville et al., 2020; Cheikh-Ammar, 2018). In this regard, our study breaks new ground by introducing personal political values (Schwartz et al., 2010) to the IS literature via the context of affordances.

Third, we contribute to the fast-growing blockchain technology literature and its conversation on the role of political ideologies (e.g., decentralization) in blockchain technology assimilation (Golumbia, 2016; Hoffman et al., 2020; Tumasjan, 2021) by systematically theorizing on why libertarianism may be connected to Bitcoin and its affordances. Whereas prior blockchain research on the role of political ideologies in shaping use behavior has been exploratory, we advance blockchain research by systematically developing and testing new theory linking personal political values and affordances in the context of Bitcoin. In doing so, we directly address recent calls for theory-driven and empirically rigorous work on blockchain technology and its societal implications (Rossi et al., 2019), thereby laying the groundwork for future theory-developing blockchain research.

2 Research on Bitcoin and Blockchain Technology

2.1 The Bitcoin System

Within a decade of the Bitcoin whitepaper's release (Nakamoto, 2008b), Bitcoin and the underlying blockchain technology created an entirely new ecosystem. What began as a small project by a group of cypherpunks has grown into an international blockchain industry with a multitude of participants engaged in vibrant entrepreneurial and corporate activity (Friedlmaier et al., 2018; Tumasjan, 2021). Notably, according to new research, this rapid ecosystem

expansion has been fueled by an ideological impetus stemming from Bitcoin's ongoing attempt to decentralize and liberalize financial markets (Atzori, 2017; Tumasjan, 2021).

To enable its functioning as a system for digital value storage and payments, Bitcoin orchestrates a bundle of IT artifacts[2] (i.e., distributed public ledgers, a proof-of-work consensus mechanism, public key cryptography) that work in concert (Beck, 2018; Beck et al., 2016; Du et al., 2019; for technical details, see Antonopoulos, 2018; Nakamoto, 2008b). First, distributed public ledgers record all transactions between participants of Bitcoin's peer-to-peer network. Instead of a centralized database, distributed ledgers keep track of Bitcoin's history across multiple nodes, and manipulating ledgers is considered nearly impossible (Beck et al., 2018). Furthermore, the public nature of Bitcoin ensures that anyone can join the network to inspect a ledger and conduct transactions.

Second, the proof-of-work consensus mechanism cryptographically secures the updating and consistency of ledgers without relying on a central authority to govern Bitcoin. To facilitate proof-of-work, an algorithm distributes decision-making power among human agents (i.e., miners) who contribute to consensus building (see Rossi et al., 2019).

Third, public key cryptography is used to create a key pair that controls access to bitcoin transactions (Antonopoulos, 2018). Moreover, public key cryptography ensures that a wallet owner's real identity is masked by a pseudonym (i.e., the wallet address and its public and private key). Thus, using multiple wallet addresses as pseudonyms can help bolster an owner's privacy (Fabian et al., 2016).

Taken together, the interplay between these key artifacts supports the notion of Bitcoin as an ideologically driven decentralized digital currency (Karlstrøm, 2014) because political ideals, such as decentralization, democracy, and privacy, are technically "implemented using

[2] According to the broad definition of IT artifacts as "bundles of material and cultural properties packaged in some socially recognizable form such as hardware and/or software" (Orlikowski & Iacono, 2001, p. 121), IT artifacts can take many forms, such as a set of features, a software application, or a social network (Demetis & Kietzmann, 2021).

algorithms that run over a network of computers with varying computing power" (Islam et al., 2019, p. 5). Importantly, these IT artifacts help explain Bitcoin affordances from a technical functionality perspective but not from a human-centered—namely, a *values-oriented*—perspective because affordances arise from the relationship between human goals and the IT artifacts of a technology (Markus & Silver, 2008). In other words, understanding IT artifacts and their interaction with individuals' basic goals expressed by their personal values helps explain people's perceptions about what a technology can do for them as well as how particular affordances are more salient to different individuals. To clarify the IT artifact-based origin of Bitcoin affordances, in the following section, we synthesize the affordances of Bitcoin based on the prior blockchain literature. In the subsequent section, we develop theory on the link between values and affordances to explain the human-centered origin of affordances. We then build on our theorizing on the origin of affordances to develop and test hypotheses on how individuals' values influence their attitudes toward Bitcoin affordances and their Bitcoin use behavior.

2.2 The Affordances of Bitcoin

Affordances of an object prompt living beings to take goal-oriented actions that may result from what living beings perceive when they look at the object (Gibson, 1979). For example, "a chair affords an adult human the possibility of sitting … Similarly, an email system affords a user who has appropriate capabilities the possibility of communicating" (Volkoff & Strong, 2017, p. 233). Transferred to the IS context, technology affordances are defined as *goal-oriented* action possibilities afforded by technical objects to users (Du et al., 2019; Karahanna et al., 2018; Markus & Silver, 2008).

Research has not yet identified the central affordances of Bitcoin or of its underlying public permissionless blockchain technology.[3] Moreover, the current blockchain literature describes blockchain technology using a lexical conglomeration that intermingles general characteristics, principles, features, and affordances. For instance, Risius and Spohrer (2017) labeled "decentralization" as both an affordance and a feature, thus leaving the question of what decentralization can actually afford blockchain users open. Similarly, the widely described notion of "trust-free" blockchain systems builds on a holistic bundle of blockchain features but does not explain what different affordances trustlessness can offer users based on different IT artifacts (Beck et al., 2016; Hawlitschek et al., 2018). Thus, understanding how the trustless nature of blockchains affect users' assimilation remains an ongoing challenge for future research (Hawlitschek et al., 2018). In conclusion, a systematic understanding of what affordances Bitcoin and public blockchain technology can actually offer users is still lacking.

To synthesize the central affordances of Bitcoin, we took an integrative two-step approach. In line with established approaches to identifying affordances (e.g., Chan et al., 2019; Karahanna et al., 2018), we comprehensively reviewed prior research on (1) blockchain affordances and (2) the sociomaterial characteristics of Bitcoin and blockchain technology.

In the first step, we reviewed prior research identifying blockchain affordances. Despite the emerging initial research, only the three affordances (i.e., settling payments directly, automating transactions, securing loans from financial institutions) identified by Du et al. (2019) can be considered established in IS research thus far (Rossi et al., 2019). However, these affordances focus on the organizational context—that is, how organizations (rather than individuals) can benefit from blockchain technology (Du et al., 2019). Moreover, these affordances do not relate exclusively to Bitcoin and its underlying public blockchain

[3] In public permissionless blockchain systems, such as Bitcoin and Ethereum, every user can read, submit, and validate transactions (for a classification of blockchain designs, see Beck et al., 2018).

technology. For instance, the affordance of automating transactions relies on an IT artifact (i.e., smart contracts) that is not involved in Bitcoin in its full functionality.

Thus, in the second step, we comprehensively reviewed research on the sociomaterial characteristics of Bitcoin and blockchain technology. We screened 41 papers (see Appendix B, Table B1) on blockchain technology that have focused on specific affordances, such as decentralization (e.g., Hoffman et al., 2020); provided feature-based taxonomies (e.g., Kannengießer et al., 2020); or summarized the central principles, concepts, and characteristics of blockchain technology (e.g., Iansiti & Lakhani, 2017). We then identified which blockchain attributes were mentioned, counted their frequency across all articles, and mapped them to the focal IT artifacts (see Section 2.1) of Bitcoin, consistent with the approach of Du et al. (2019) (see Appendix B, Figure B). Following the principles for conceptualizing affordances (Leidner et al., 2018; Volkoff & Strong, 2017), we derived the key affordances of Bitcoin based on the prompting character of the respective attributes and focal artifacts. For instance, the frequently mentioned pseudonymity attribute of Bitcoin builds on the IT artifact of public key cryptography that ensures that a wallet owner's real identity is masked by a pseudonym. This attribute and the focal artifact provide individuals the affordance of identity protection, prompting them to use multiple Bitcoin wallet addresses to enhance their privacy compared to traditional online payment systems. In addition, we consolidated our findings by discussing the key Bitcoin affordances with seven experts from research and practice (see Appendix B, Table B2). In doing so, we identified and developed affordances specific to the Bitcoin context. For instance, we identified value creation as a central affordance of Bitcoin reflecting economic interests due to Bitcoin's highly volatile nature and its status as the largest (by far) cryptocurrency in terms of market capitalization.

In summary, our approach to consolidation involved identifying blockchain affordances that specifically rely on the Bitcoin blockchain and generating a set of key affordances that capture the essence of what users can potentially do through their use of Bitcoin. These key

affordances are based on Bitcoin's original design goals of moving away from centralized control while providing tamper resistance among peers who do not necessarily trust each other (see Golumbia, 2016; Hoffman et al., 2020). This procedure resulted in the iterative identification of the four Bitcoin affordances shown in Table 1.

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3 Attitudes Toward Bitcoin Affordances and Bitcoin Use Behavior: A Personal Values Perspective

Early studies on Bitcoin have stressed the importance of (libertarian) political ideologies in influencing individuals' overall perceptions of Bitcoin (e.g., Bashir et al., 2016; Bohr & Bashir, 2014; Golumbia, 2016). Specifically, studies have shown that the "libertarian ideology was the only consistent factor for both attitudes and experience with the virtual currency" (Bashir et al., 2016, p. 362), which is consistent with the finding that early bitcoin owners were most likely to identify as libertarians compared to other political ideologies (Bohr & Bashir, 2014). Consequently, research on political ideologies has played a crucial role in many blockchain studies (e.g., Harvey & Branco-Illodo, 2020; Inwood & Zappavigna, 2021; Islam et al., 2019), and the associated findings provide initial evidence that personal political values (Schwartz et al., 2010) may play a substantial role in individuals' decisions to assimilate technologies (for related discussions and empirical findings, see Golumbia, 2016; Lawrence & Mudge, 2019; Tumasjan, 2021).

However, we currently lack systematic theory and empirical research on the potential link between personal political values and technology assimilation. We attempt to fill this gap using the concept of affordances, linking it with values, and developing and testing theory on

the VA relationship to understand why people engage with sociotechnical systems like Bitcoin. Thus, in the following sections, we describe this theory development and hypothesize that personal values (i.e., libertarian political values) have positive (1) direct effects on individuals' attitudes toward Bitcoin affordances and (2) indirect effects on their Bitcoin use behavior mediated by its affordances.

3.1 Linking Values to Affordances

We build on the emerging research stream that has identified a link between values and affordances (Cheikh-Ammar, 2018; Snyder et al., 2016). While significant research on the IT artifact- and feature-based origin of affordances has been conducted (e.g., Karahanna et al., 2018; Markus & Silver, 2008), a systematic understanding of how human goals and values contribute to the emergence of affordances is still lacking. To date, there have been only two studies directly linking values to the concept of affordances (Cheikh-Ammar, 2018; Snyder et al., 2016). In particular, Cheikh-Ammar (2018, p. 286) argued that "values do not stem directly from the [technology] features themselves, but are instead rooted in the enactment of … an affordance." This view is supported by Snyder et al. (2016, p. 2018), who foregrounded the notion of "values-oriented affordances," contending that "values … are often concretized through affordances." Building on personal values research (Schwartz, 2012; Schwartz et al., 2010), this link enables us to theoretically explain how values guide individuals' attitudes toward affordances, to which we now turn.

3.1.1 Personal Values

Personal values are defined as broad, desirable, and trans-situational goals that vary in importance and serve as guiding principles in life (Schwartz, 1992, 2012; Schwartz et al., 2012).

Values[4] represent what is important to people in life and motivate action over time and across situations because "they are grounded in … [the] universal requirements of human existence with which they help to cope" (Schwartz, 2012, p. 4). The hierarchical system of priorities formed by values characterizes people as individuals; serves as a standard for evaluating actions, policies, people, and events; and encourages individuals to "act in ways that allow them to express their important values" (Sagiv et al., 2017, p. 631; Schwartz, 2012). Thus, values serve as critical motivators for human behavior in all areas of life (Schwartz, 2012).

In this vein, personal values have proven their capacity and validity in explaining a large variety of perceptions, attitudes, and overt behaviors (Sagiv et al., 2017) in various research domains, including in the contexts of politics (Barnea & Schwartz, 1998; Schwartz et al., 2010) and IS adoption (Tams et al., 2020). Because our context includes Bitcoin and political ideologies, we concentrate on the personal values underlying political attitudes (i.e., *personal political values*; Schwartz et al., 2010). Specifically, we focus on the personal political values underlying libertarian attitudes (i.e., *libertarian political values*) because they are particularly relevant to individuals' overall perceptions of Bitcoin (Bashir et al., 2016; Bohr & Bashir, 2014; Golumbia, 2016).

3.1.2 How Values Relate to Affordances

Importantly, values help explain affordances from a human-centered—namely, a *values-oriented*—perspective rather than a technical function-based perspective because affordances originate in both IT artifacts and human goals (Cheikh-Ammar, 2018; Du et al., 2019; Markus & Silver, 2008). This means that an affordance cannot be described by only specifying and focusing on the functionality of a technology since doing so does not reveal the

[4] In this paper, we use the terms "values" and "personal values" interchangeably. Personal values differ from cultural values (for a review, see Leidner & Kayworth, 2006) in that cultural values represent the shared desirable goals of social collectives, whereas personal values reflect an individual's personality and unique experiences (Roccas & Sagiv, 2010; Schwartz, 2014). Members of a society may thus share some important cultural values while simultaneously differing considerably in their personal value hierarchies (Roccas & Sagiv, 2010).

various goal-oriented ways in which the technology can be used. For example, email's general functions of asynchronous and cross-site communication do not prevent people from using it for other purposes (Majchrzak & Markus, 2013). Instead, some people might also use email to communicate synchronously with others in their immediate vicinity because doing so enables them to create a written record of communication or to avoid face-to-face conversations with colleagues they dislike (Majchrzak & Markus, 2013). In the case of fundamental goals individuals pursue through technology use, values often become inextricably linked to affordances (Cheikh-Ammar, 2018). More precisely, if a technology enables people to achieve certain fundamental goals expressed by their important values, they might have positive attitudes toward certain affordances through which they can achieve those goals. For example, individuals who cherish the value of power (i.e., social status and prestige, control or dominance over people and resources; Schwartz, 2012) might view Facebook's affordance of collecting likes positively because it enables the expression of status within a social network (Cheikh-Ammar, 2018). Thus, individuals' values guide what affordances they notice in a technology and what they believe those affordances can offer them. In other words, values help explain why individuals differ in the importance they assign to affordances.

3.1.3 A Values-Affordances Perspective for Bitcoin

In the context of Bitcoin, the affordances (i.e., decentralized self-reliance, verification, value creation, and identity protection) evoke different subjective attitudes toward them because these affordances do not focus solely on objective functions (e.g., making payments) but are tied relatively closely to certain personal values (i.e., personal political values underlying libertarian attitudes) embodied in the relationship between users and the artifacts of the Bitcoin system (Cheikh-Ammar, 2018; Golumbia, 2016; Nakamoto, 2008a). This perspective implies that individuals' attitudes toward Bitcoin affordances may not depend, per se, on how they perceive the artifacts and technical functions of Bitcoin, which are complex and difficult for

most users to grasp (Beck et al., 2017; Du et al., 2019), but rather whether these affordances address their personal values (i.e., libertarian political values).

First, the Bitcoin affordance of *decentralized self-reliance* enables individuals to increase their independence from centralized powers. This affordance is attractive to individuals who endorse libertarian political values because the unregulated peer-to-peer asset transactions afforded by decentralized self-reliance can be a means to achieve the personal freedom and free-market economics that libertarians seek to maximize (Atzori, 2017; Boaz, 2015). In contrast, individuals who do not uphold libertarian political values (e.g., vis-à-vis values underlying authoritarianism) will be less attracted to the affordance of decentralized self-reliance because they may not feel the need to have unregulated asset transactions due to a lack of trusted authorities.

Second, personal values likely influence individuals' attitudes toward the Bitcoin affordance of *verification*, which enables individuals to record and verify the financial activities of a monetary system. Specifically, individuals endorsing libertarian political values likely have positive attitudes toward verification because the full self-control over financial assets and access to a provable financial system afforded by verification allows them to address their needs for personal autonomy and control without governmental oversight (Atzori, 2017; Barnea & Schwartz, 1998).

Third, the Bitcoin affordance of *value creation* reflects economic interests and suggests that Bitcoin invites anybody to engage in a valuable emerging technology that many argue protects against inflation (Golumbia, 2016). From a libertarian perspective, inflation implies government intervention and is often viewed as a consequence of monetary policy rather than of economic factors, such as consumer prices (Boaz, 2015; Golumbia, 2016). Therefore, individuals who cherish libertarian political values likely have positive attitudes toward the Bitcoin affordance of value creation because they see Bitcoin as an inflation hedge through the

lens of this affordance, thereby reducing their reliance on government engagement in the economy.

Fourth, personal values also likely affect individuals' attitudes toward the Bitcoin affordance of *identity protection*, which enables individuals to safeguard their privacy compared to traditional online payment services. Specifically, individuals who cherish libertarian political values likely have positive attitudes toward identity protection because increasing one's degree of anonymity coincides with the libertarian idea of protecting civil rights by ensuring users own their personal information (Golumbia, 2016).

To sum up, the values perspective serves as a powerful lens through which to understand why certain individuals favor certain affordances and aids in understanding users' thoughts about how Bitcoin and its affordances can address their values. Overall, we propose the following:

> **H1**: Personal values (i.e., libertarian political values) have positive direct effects on individuals' attitudes toward the four Bitcoin affordances: (a) decentralized self-reliance, (b) verification, (c) value creation, and (d) identity protection.

3.2 Linking Values to Use Behavior via Affordances

In line with personal values research in the IS context (e.g., Jayawardhena, 2004; Lee & Lyu, 2016), we propose that values do not influence technology use behavior directly but rather do so by affecting individuals' attitudes toward technology affordances, which in turn affect use behavior. Building on prior affordances research (Cheikh-Ammar, 2018), we base our rationale underlying this mediation hypothesis on the insight that users are more likely to use a technology when that technology offers affordances through which they believe they can address their prioritized values. In other words, personal values manifest in individuals' attitudes toward affordances, which guide their actual use behavior (Karahanna et al., 2018). This reasoning is in line with the theoretical account of the values-attitude-behavior hierarchy (Homer & Kahle, 1988; Rokeach, 1973) in which attitudes underlying certain possible

behaviors (e.g., attitudes toward affordances) mediate the relationship between these behaviors and personal values.

An alternative way to understand why personal values may not affect technology use behavior directly but may do so indirectly through technology affordances is to consider that many people may not be able to discern how cherishing important personal values has consistent implications for their technology use decisions (Schwartz et al., 2010). Indeed, people may endorse the same basic value to justify both the use and prohibition of a technology (e.g., invoking "sustainability" to justify or to oppose the use of Bitcoin; for related discussions, see Malmo, 2015; Moy & Carlson, 2021; Sandner et al., 2020). Moreover, use behavior may not be linked to values at all if individuals do not notice a technology's affordances or lack information on how a technology can be used. For example, simply owning bitcoins as part of an investment portfolio strategy with limited knowledge of how Bitcoin works may not be the result of addressing personal values (i.e., libertarian political values) because such use behavior does not bypass centralized powers (i.e., financial institutions) and thus does not appeal to libertarian political values. Therefore, we believe that affordances serve as an important theoretical lens to better understand whether and how individuals perceive the implications of cherishing their personal values for their technology use.

Thus, considering the extant literature and based on the VA perspective developed above, we assume that personal values have direct effects on individuals' attitudes toward Bitcoin affordances (i.e., decentralized self-reliance, verification, value creation, and identity protection). In turn, we contend that individuals' attitudes toward these affordances positively influence their Bitcoin use behavior. For instance, empirical evidence has already shown that attitudes toward the decentralized nature of Bitcoin (i.e., the affordance of decentralized self-reliance), security and control (i.e., the affordances of transparency and identity protection), and profit expectancy (i.e., the affordance of value creation) are relevant factors in the decision to use Bitcoin (Abramova & Böhme, 2016; Mattke et al., 2021). Consequently, we theorize that

these four Bitcoin affordances serve as a mechanism that translates values into concrete use behavior. Building on this reasoning, we propose that personal values have indirect effects on Bitcoin use behavior (see Figure 1), leading to the following mediation hypothesis:

> **H2**: Personal values (i.e., libertarian political values) have positive indirect effects on Bitcoin use behavior mediated by the four Bitcoin affordances: (a) decentralized self-reliance, (b) verification, (c) value creation, and (d) identity protection.

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4 Methods

4.1 Research Design

To collect our data, we used a multiple administration survey design with two time points (T1 and T2) (Strobel et al., 2017). This survey design was chosen to address potential problems of common method variance (Podsakoff et al., 2012; Strobel et al., 2017). Our overall survey approach is in line with prior research examining technology use from an affordance perspective (Chan et al., 2019).

4.2 Instrument Development and Pretest

Because the extant literature provides no scales to assess Bitcoin affordances, we developed a new scale for this purpose. We followed established guidelines to develop the items for the four Bitcoin affordances (i.e., decentralized self-reliance, verification, value creation, and identity protection) (DeVellis, 2017; Moore & Benbasat, 1991). First, to create the initial items, we reviewed the prior literature (for details, see Section 2.2) and used feedback from four experienced Bitcoin and blockchain scholars to ensure the items' content validity. This first step resulted in an initial list of 33 items.

Second, to assess construct validity, we conducted two rounds of item-sorting exercises with two different sets of judges (four different blockchain technology scholars—who are experienced users of Bitcoin and other cryptocurrencies—for each round). After the first round, we dropped four items that could not be reliably assigned to the target dimension. In the second round of item sorting, interjudge agreement was good (average Cohen's kappa = 0.82). The placement ratio of items within the intended constructs averaged 90%. Overall, the interjudge agreement score and the average item placement ratio demonstrate both the reliability of the classification scheme and the validity of the items and are in line with values found in prior research (e.g., Benlian et al., 2011). After incorporating the feedback from the eight judges, we selected a set of 27 items to test the instrument.

Third, we conducted a pretest of the instrument with 196 IT professionals to establish the scales' construct reliability and validity, while retaining the largest possible number of items. These items were assessed in the main study to further refine and validate the scale. We used the recommended thresholds for composite reliability (CR > 0.70), convergent validity (AVE > 0.50), and discriminant validity (MSV < AVE, square root of AVE greater than interconstruct correlations) to evaluate the reliability and validity of the pretest measurement model (Hair et al., 2019). Our results demonstrate good scale reliabilities of all four constructs as well as convergent and discriminant validity (for detailed analyses and indices, see Appendix C, Table C1). Eight items were dropped because they had either a low factor loading on their target construct or high cross-loadings with other constructs. In summary, the instrument development process resulted in 19 items for measuring the four Bitcoin affordances (for details, see Appendix C, Table C2), which were further refined and validated in the main survey.

4.3 Participant Recruitment and Sample

Following recent IS research (Tams et al., 2020; Trenz et al., 2020), a professional online panel provider was used to recruit the study participants. Consistent with prior IS studies (e.g., Cho & Park, 2021), we employed the panel provider Cint (www.cint.com), which has access to more than 155 million individuals in more than 130 countries. As our population of interest, we sampled IT professionals[5] aged 21-65 to ensure that they could make informed judgments on IS affordances and public blockchain technology (i.e., Bitcoin).

We focused on both users and nonusers of Bitcoin to avoid expert bias and to compare values and attitudes toward of affordances between individuals who adopt versus do not adopt the technology. We sampled IT professionals from various countries where (a) there is a substantial share of cryptocurrency users and (b) English is the official language (i.e., India, South Africa, United Kingdom, Singapore, Canada, Australia, Hong Kong, United States). Consistent with prior IS research (Suh et al., 2017; Trenz et al., 2020), we chose to use a demographically diverse sample from different countries rather than a homogeneous sample to ensure the generalizability of our research.

To address potential common method bias, we followed the recommendations of Podsakoff et al. (2012) and collected data at two different time points, with a time lag of approximately one week, in line with prior research (e.g., Sedera et al., 2017). At time 1 (T1), the participants completed the items on the independent variables (i.e., libertarian political values), as well as other political values, and provided sociodemographic information. We then invited the T1 respondents to participate at time 2 (T2) in the second part of the survey, in which we assessed the Bitcoin affordances and Bitcoin use as well as further control variables (i.e., Bitcoin knowledge, disposition to trust technology, and technology self-efficacy).

[5] We queried the following IT professions: CTO, CIO, IT director, IT sales, IT customer service, IT quality assurance, IT procurement, other IT manager/consultant, software engineer, programmer, web developer, computer systems analyst, network engineer, database administrator, IT security, hardware engineer, technical support, and other IT architect.

At the beginning of the questionnaire, we assured the participants that participation was voluntary and that their data would remain anonymous, and we secured their informed consent to take part in the survey. Subsequently, the screening questions on age, country of residence, and IT profession ensured that respondents met the sample requirements.

Due to potential inattentiveness issues in web-based data collection, we applied the recommended measures to ensure our dataset's quality, including direct measures (i.e., instructed attentiveness items) and indirect measures (i.e., response invariability and response time) (see Appendix D; Huang et al., 2012; Lowry et al., 2016). To ensure high-quality responses, we applied a conservative approach using three instructed attentiveness items that were worded and laid out similarly to the other items, so as to apply a strict measure of attentive responses during the initial phase of participant recruitment (see Appendix D). Of the 3,323 participants who successfully answered the screening questions, 2,128 did not answer both instructed attentiveness items in T1 correctly. Of the 1,195 valid respondents at T1, 387 participated in the second survey at T2. In T2, 105 respondents failed to answer the third instructed attentiveness item correctly, which yielded a sample of 282 matched T1 and T2 responses. In addition to the direct measures of instructed attentiveness items, we also used indirect measures of response invariability and response time to detect careless responding (see Appendix D for details; Dunn et al., 2018; Huang et al., 2012). After removing 14 respondents due to missing information about their Bitcoin use, we obtained a final valid sample of 236 for subsequent analyses.

The participants were on average 35.16 years old; 60.17% were male, and 62.71% were current Bitcoin users. The distribution of participants' country of residence was as follows: 64.83% India, 14.41% South Africa, 10.17% United Kingdom, 3.81% Singapore, 2.12% Canada, 1.69% Australia, 1.69% Hong Kong, and 1.27% United States. Regarding the participants' education level, 60.59% held a bachelor's degree or less, and 39.41% at least a master's degree.

4.4 Variables and Measures

We used established scales from the literature to assess our study variables. If no established scales existed, we followed established guidelines for developing new scales (i.e., Bitcoin affordances and Bitcoin use behavior) (DeVellis, 2017; Moore & Benbasat, 1991).

4.4.1 Libertarian Political Values

In line with the extant research, we used the personal political values of civil liberties (i.e., freedom to act and think as each individual considers most appropriate) and free enterprise (i.e., minimal governmental involvement in the economy; economic individualism) as indicators of libertarian attitudes (Golumbia, 2016; Heath et al., 1994; Schwartz et al., 2010). Civil liberties are at the heart of libertarianism because they encompass the fundamental concept of individual freedom for which libertarians strive (Hausman & McPherson, 2006). Similarly, free enterprise is a core aspect of libertarianism because it expresses the unleashing of liberty from state coercion (Atzori, 2017; Hausman & McPherson, 2006). Thus, both civil liberties and free enterprise reflect core libertarian political beliefs (Boaz, 2015; Hausman & McPherson, 2006). To measure civil liberties and free enterprise, we used Schwartz et al.'s (2010) personal political values scales and asked participants to rate how much the statements reflected their core political values (1 = "completely disagree" to 5 = "completely agree"). Example statements include "It is extremely important to respect the freedom of individuals to be and believe whatever they want" (civil liberties) and "It would be a good idea to privatize all of the public enterprises" (free enterprise).

4.4.2 Bitcoin Affordances

Following the recommendations of Moore and Benbasat (1991), we developed a new instrument to measure the Bitcoin affordances (i.e., decentralized self-reliance, verification, value creation, and identity protection). The instrument development process is described in detail in Sections 4.2 and 5.1. We asked participants to rate the extent to which Bitcoin promotes

certain possibilities for them (1 = “strongly disagree” to 7 = “strongly agree”). For example, to measure the affordance of value creation, we used the item: “Bitcoin offers me the possibility to increase my wealth”. The full set of measurement items for Bitcoin’s four affordance dimensions can be found in Appendix C, Table C2, and Appendix E, Table E1.

4.4.3 Bitcoin Use Behavior

We developed a new scale to assess Bitcoin use behavior because there are no such established scales in the extant literature. Prior studies on Bitcoin use mainly analyzed *how* and *why* Bitcoin is used (e.g., as an investment or a means of payment) (Abramova & Böhme, 2016; Glaser et al., 2014; Mattke et al., 2021). Consequently, prior Bitcoin use-related scales have been developed or adapted so far to measure, for example, purpose-related usage behavior (Abramova & Böhme, 2016), investment or buying intention (Martin et al., 2022; Mattke et al., 2021), or presence of ownership (Bashir et al., 2016). However, either these scales are not applicable to a sample consisting of both individuals who have never owned bitcoins and individuals who own or have owned bitcoins (for purpose-related usage behavior and investment or buying intention), or they do not indicate a differentiated degree of actual use (for presence of ownership). Because we wanted to understand how libertarian political values affect Bitcoin use behavior beyond the mere presence of current ownership, we developed a new scale that comprehensively measures individuals’ Bitcoin use behavior at different time points in the past, present, and future. To assess Bitcoin use behavior, we asked participants (1) if they currently owned bitcoins (“no”, “yes”, “I don’t know”); (2) if they had owned bitcoins in the past that they sold (“no”, “yes”, “I don’t know”); (3) if they were considering purchasing bitcoins in the next 12 months (“no”, “yes”, “I don’t know”); and (4) when they bought bitcoins for the first time (1 = “never”, 2 = “> 0 to < 6 months ago”, 3 = “6 to < 12 months ago”, 4 = “1 to < 2 years ago”, 5 = “2 to < 5 years ago”, 6 = “At least 5 years ago”, 7 = “I don’t know”). Based on the combination of these responses, we created a 10-point scale ranging from 1 (never

owned bitcoins, no intention to purchase bitcoins in the near future) to 10 (current user who first bought bitcoins at least two years ago and is considering purchasing bitcoins in the near future).

4.4.4 Control Variables

We included several control variables that may influence our proposed relationships. First, we controlled for the personal political values of traditional morality and law and order as defined by Schwartz et al. (2010)[6] because we wanted to rule out possible influences resulting from differences in personal political values other than libertarian political values. Second, we controlled for technology-related self-efficacy using Huffman et al.'s (2013) scale because individuals with high self-efficacy are more likely to be early adopters of technology (Compeau & Higgins, 1995). Using a 10-item scale, we asked participants to rate their confidence in using new technology in certain circumstances (1 = "not at all confident" to 10 = "totally confident"; sample item: "I could complete any desired task using the new technology if I had only the manuals for reference"). Third, we used a 3-item scale to control for disposition to trust technology (1 = "strongly disagree" to 7 = "strongly agree"; sample item: "I usually trust in information technology until it gives me a reason not to"), because this variable may influence our proposed relationships (Lankton et al., 2015; McKnight et al., 2002). Fourth, we accounted for Bitcoin knowledge, as assessed by four statements adapted from Henry et al. (2019) (e.g., "The total supply of bitcoins is fixed"), to inspect whether our proposed effects are influenced

[6] Schwartz et al. (2010) selected six constructs that capture personal political values identified in prior research: civil liberties, free enterprise, traditional morality, law and order, blind patriotism, and equality. Factor analysis suggested excluding the constructs of blind patriotism and equality and retaining 14 items due to validity issues. The poor fit of these invalid constructs must be considered in light of different political contexts, because we assessed personal political values globally across very different countries. Variations in the meaning of some political values may have been influenced by countries' different political histories, which is likely in cross-political settings (Schwartz et al., 2014). Furthermore, we had to remove, for example, a reverse-coded item due to its low factor loading, which is a prevalent issue with self-report scales, particularly in cross-cultural studies (Schwartz et al., 2014; Wong et al., 2003). A separate confirmatory factor analysis (CFA) with the four personal political values (i.e., civil liberties, free enterprise, traditional morality, law and order) indicated good model fit properties (chi square/df = 2.20; CFI = 0.94; RMSEA = 0.07; SRMR = 0.06).

by knowledge about Bitcoin among both owners and nonowners. Fifth, we also controlled for the presence of bitcoin ownership or former ownership using a dummy variable (i.e., bitcoin owner) to test whether there are differences in the attitudes toward Bitcoin affordances between individuals who have and have not owned bitcoins. Finally, we controlled for participants' country of residence by taking into account the different political contexts of Western and non-Western countries using a dummy variable (i.e., non-Western country), as well as education, age, and gender, because these demographic differences help explain users' behavior toward technology assimilation (Fontaine et al., 2008; Leidner & Kayworth, 2006; Steelman et al., 2014).

4.5 Analytical Techniques

We employed two methodological approaches to (a) generate the measurement model and (b) test our hypotheses. First, we conducted confirmatory factor analysis with the AMOS software program to determine the reliability and validity of the constructs and the overall measurement structure. Second, to test our hypotheses, we conducted ordinary least squares (OLS) regression analysis to test the direct effects of libertarian political values on Bitcoin affordances (H1). We used Hayes's (2018) PROCESS macro in SPSS to evaluate the simple mediating role of each Bitcoin affordance in the relationship between libertarian political values and Bitcoin use behavior (H2), using estimates with heteroscedasticity-robust standard errors and bootstrapping processes to test for indirect effects.

5 Analysis and Results

5.1 Affordance Scale Refinement

To further refine and validate our affordance scale across countries, we conducted exploratory (EFA) and confirmatory factor analysis (CFA). EFA suggested retaining 13 of our 19 pretest items (see Appendix E, Table E1), as the 13-item solution is more robust across the

different countries in our main study sample (i.e., India, South Africa, United Kingdom, Singapore, Canada, Australia, Hong Kong, United States), whereas the 19-item solution is more appropriate for only the pretest country sample (i.e., United Kingdom, Canada, Australia, United States).[7]

5.2 Measurement Model

Our final measurement model consisted of six latent constructs (i.e., two libertarian political values and four Bitcoin affordances). In line with Hair et al. (2019), we assessed (1) key fit statistics and (2) construct validity to validate our measurement model with CFA. First, to inspect the overall model fit, we report the chi-square value per degree of freedom (chi square/df), the absolute fit measures of the root mean squared error approximation (RMSEA) and standardized root mean residual (SRMR), and the incremental fit measure of the comparative fit index (CFI), as recommended by Hair et al. (2019). Using the Bollen-Stine bootstrap p-value, we also bootstrapped the fit statistics from the sample observations to account for multivariate nonnormality in our data (Bollen & Stine, 1992). Based on these fit indices' thresholds (Hair et al., 2019), our proposed measurement model demonstrated high goodness of fit (chi square/df = 1.16; RMSEA = 0.03; SRMR = 0.04; CFI = 0.99; Bollen-Stine bootstrap p = 0.49). Second, in accordance with Hair et al. (2019), we report composite reliability (CR), average variance extracted (AVE), maximum shared variance (MSV), the square root of AVE, and the interconstruct correlations to inspect construct validity. To assess construct validity, the recommended thresholds for composite reliability (CR > 0.70), convergent validity (AVE > 0.50), and discriminant validity (MSV < AVE, square root of AVE

[7] Conducting factor analysis in the pre-test with the final set of 13 items also yielded appropriate factor loadings and a slightly better model fit compared to the initial 19 items (19-item model: chi square/df = 2.13; RMSEA = 0.08; SRMR = 0.05; CFI = 0.95; Bollen-Stine bootstrap p = 0.02; 13-item model: chi square/df = 2.28; RMSEA = 0.08; SRMR = 0.05; CFI = 0.96; Bollen-Stine bootstrap p = 0.06). Moreover, the direction and statistical significance of our main effects do not change when using either the 19-item pre-test scale or the 13-item main study scale.

greater than interconstruct correlations) were used (Hair et al., 2019). For each construct, our results indicate good reliability as well as convergent and discriminant validity (see Appendix E, Table E2).

To address potential common method bias (CMB), we ensured participants' anonymity and created a one-week time lag between data collection points for the independent and dependent variables as procedural ex ante remedies in line with extant recommendations (Podsakoff et al., 2012). Moreover, the results of the CFA marker approach (Williams et al., 2010; for a review, see Richardson et al., 2009) used to assess CMB post hoc demonstrate that CMB does not pose a concern for our study.[8]

5.3 Hypothesis Testing

Hypothesis H1 stated that personal values (i.e., libertarian political values as indicated by civil liberties and free enterprise) have positive direct effects on individuals' attitudes toward the four Bitcoin affordances: (a) decentralized self-reliance, (b) verification, (c) value creation, and (d) identity protection. To test H1, we conducted a regression analysis on libertarian political values and the affordances of decentralized self-reliance (Model 1), verification (Model 2), value creation (Model 3), and identity protection (Model 4) (see Table 2).

[8] Using this approach, we (a) included, as recommended by Simmering et al. (2015), an a priori chosen marker variable of the attitude toward the color blue, which is theoretically unrelated to the nomological net of the research model, and (b) compared the fit of two nested models that contain paths to each of the latent marker's manifest indicators as well as paths to the manifest indicators of all substantive constructs. In the first model (constrained model), we restricted the paths from the marker construct to all indicators of the substantive constructs to zero, thereby assuming no common method variance. In the second model (unconstrained model), the paths from the marker construct to all indicators of the substantive constructs were not restricted, thereby assuming common method variance. If the unconstrained model has a markedly improved model fit compared to the constrained model, then common method variance is likely to have an impact on the model's relationships (Richardson et al., 2009). Fit indices show that both models fit the data well (constrained model: chi square/df = 1.16; RMSEA = 0.03; SRMR = 0.06; CFI = 0.99; Bollen-Stine bootstrap p = 0.51; unconstrained model: chi square/df = 1.16; RMSEA = 0.03; SRMR = 0.04; CFI = 0.99; Bollen-Stine bootstrap p = 0.53). In addition, a chi-square difference test between the constrained and unconstrained models shows that the models do not significantly differ in terms of fit (nested chi square difference, p = 0.31 [chi square difference = (249.05 − 226.38) = 28.68; df = (215 − 195) = 20]), further demonstrating that CMB does not pose a concern for our study.

INSERT TABLE 2 ABOUT HERE

Supporting H1, models 1-4 (main effects including controls) show that libertarian political values (i.e., civil liberties) significantly predict the affordances of decentralized self-reliance (H1a; beta = 0.21, $p < 0.01$), verification (H1b; beta = 0.19, $p < 0.01$), value creation (H1c; beta = 0.25, $p < 0.001$), and identity protection (H1d; beta = 0.21, $p < 0.01$).

Hypothesis H2 stated that personal values (i.e., libertarian political values as indicated by civil liberties and free enterprise) have positive indirect effects on Bitcoin use behavior mediated by the four Bitcoin affordances: (a) decentralized self-reliance, (b) verification, (c) value creation, and (d) identity protection. To test H2, we used a simple mediation model (Hayes, 2018) based on 10,000 bootstrap samples using PROCESS (Hayes, 2018; Preacher & Hayes, 2008). Figure 2 illustrates the simple mediation models that allow us to understand the mediating role of each affordance in isolation.

INSERT FIGURE 2 ABOUT HERE

We report the results with control variables (see Table 3). The presence of mediation is indicated by the confidence intervals (CIs) of the indirect effects (i.e., ab), and a mediation effect can be concluded if these CIs do not include zero. Additionally, if the direct effect (i.e., c') has a CI that includes zero, there is evidence of full mediation; otherwise, there is evidence of partial mediation.

INSERT TABLE 3 ABOUT HERE

As is evident from Table 3, there are no mediating effects of decentralized self-reliance on either civil liberties or free enterprise. However, each of the three remaining Bitcoin affordances (i.e., verification, value creation, and identity protection) fully mediates the relationship between the libertarian political value of civil liberties and Bitcoin use behavior. In turn, the libertarian political value of free enterprise is only partially mediated by the affordance of verification. Taken together, our results indicate that the effects of libertarian political values are either fully mediated by verification, value creation, and identity protection (for civil liberties) or partially mediated by verification (for free enterprise). In other words, considering each Bitcoin affordance in isolation, our data indicate support for a mediation chain between libertarian political values, Bitcoin affordances, and Bitcoin use behavior. However, the libertarian political value of free enterprise also has a direct positive effect on Bitcoin use behavior beyond the indirect effect that is mediated by the affordance of verification. Taken together, the results of the simple mediation analysis (see Table 3) do not support H2a but do support H2b, H2c, and H2d.

Table 4 summarizes the results of our hypotheses testing. Overall, our findings indicate that personal values (i.e., libertarian political values) have both direct effects on the Bitcoin affordances and indirect effects mediated by affordances on Bitcoin use behavior, indicating support for our VA perspective on why individuals assimilate information technologies.

INSERT TABLE 4 ABOUT HERE

5.4 Post Hoc Analyses

We conducted post hoc analyses (for details, see Appendix A) to test (1) whether there are overall mediating effects when the specific mediating effects of each affordance are added together (using parallel mediation analysis), (2) whether those who adopt versus do not adopt

Bitcoin place a higher weight on libertarian political values and Bitcoin affordances, and (3) whether there are direct and/or indirect effects of personal political values other than libertarian political values.

Summarizing our results of the post hoc analyses, first, our data also show a mediation chain between civil liberties, Bitcoin affordances, and Bitcoin use behavior when considering the total fully mediating effect of all four affordances (i.e., the sum of each affordance's specific indirect effect). Second, our results of the post hoc analyses indicate that owning bitcoins versus not owning bitcoins is associated with both holding higher levels of libertarian political values and more positive attitudes toward the affordances of Bitcoin. Third, our data indicate that only libertarian political values influence the Bitcoin affordances and Bitcoin use behavior, while the other personal political values (i.e., traditional morality, law and order) do not.

6 Discussion

The objective of our study was to develop and test theory on values and affordances to explain how individuals' values guide what affordances they believe a technology can offer them, which in turn motivates their technology use. Combining research on personal values (Schwartz, 2012; Schwartz et al., 2010) with affordance theory (Cheikh-Ammar, 2018; Markus & Silver, 2008), we examined (1) personal political values (i.e., libertarian political values as indicated by civil liberties and free enterprise) as predictors of individuals' attitudes toward Bitcoin affordances and (2) the extent to which personal political values influence Bitcoin use behavior through these affordances.

6.1 Summary of the Results

In line with our expectations, we found evidence that personal values (i.e., the libertarian political value of civil liberties) have direct effects on all four Bitcoin affordances (i.e., decentralized self-reliance, verification, value creation, and identity protection). Furthermore,

our mediation analysis results suggest that individuals' attitudes toward three of the four Bitcoin affordances (i.e., verification, value creation, and identity protection) fully mediate the effects of libertarian political values (i.e., civil liberties) on Bitcoin use behavior. Interestingly, the libertarian political value of free enterprise does not predict individuals' attitudes toward Bitcoin affordances but does directly predict actual Bitcoin use behavior, indicating that libertarian political values may also exert a direct influence on Bitcoin use that is not mediated by affordances. Post hoc analyses comparing the values and attitudes toward affordances of people who adopt versus do not adopt Bitcoin confirm the positive association between libertarian political values and Bitcoin assimilation. In addition, the association of personal political values with Bitcoin is confirmed only for libertarian political values, not for the other personal political values of traditional morality and law and order. Overall, these findings coalesce with the results of early Bitcoin studies in demonstrating that bitcoin owners are most likely to be libertarians compared to other political ideologies (Bashir et al., 2016; Bohr & Bashir, 2014).

6.2 Contributions, Theoretical Implications, and Future Research

We contribute to the literature by (1) advancing the theoretical discourse on the link between values and the materiality of IT, (2) advancing our understanding of how values affect technology use, and (3) advancing blockchain research on the role of political ideologies in blockchain technology assimilation. These contributions, their theoretical implications, and avenues for future research are discussed in the rest of this section (for an overview, see Table 5).

INSERT TABLE 5 ABOUT HERE

6.2.1 Values and the Materiality of IT

We advance the theoretical discussion on the link between values and the materiality of IT (Cheikh-Ammar, 2018; Markus & Silver, 2008; Snyder et al., 2016) by theorizing on the emergence of affordances from artifacts and values. Prior research has concentrated on the concept of functional affordances (Markus & Silver, 2008), which has led to affordances often being described solely from the perspective of technical features or functions (e.g., Grgecic et al., 2015). However, IS affordance research has recently been criticized for conceptualizing affordances as direct functions of a technology because doing so blurs the distinction between the concepts of affordances and technology use. For instance, Grgecic et al. (2015) measured the affordances of a student IT system (SIS) as its functionalities (e.g., the possibility to download course materials or use a forum). However, such functionalities reflect the direct use of the SIS features rather than affordances. Confusing affordances with the direct use of technology features leads to ambiguity about what affordances, actual use of technologies, and their functions offer individuals for addressing their goals and values (Leidner et al., 2018).

Moreover, as Markus and Silver (2008) pointed out, "a limitation of the functional affordances concept is that it focuses solely on issues related to technical functionality [and thus] does not support a *values-oriented* analysis of IT artifacts" (p. 622, emphasis in original). However, neglecting how human goals and values contribute to the emergence of affordances is problematic because the question of why there are interindividual differences in attitudes toward affordances remains open. In other words, it remains unclear why individuals differ in the importance they assign to technology affordances. We address this shortcoming by integrating personal values as antecedents of individuals' attitudes toward affordances and showing what important affordances technologies offer individuals from a subjective goal-oriented perspective that goes beyond the objective action-oriented view of general functions (Cheikh-Ammar, 2018). Thereby, we show that values do not manifest in technology features directly but rather materialize (i.e., can be realized and addressed) through the goal-oriented

ways individuals use technologies, as captured by the concept of affordances. Building on this VA perspective, we provide a theoretical perspective that allows researchers to systematically explain why people have differential attitudes toward technology affordances.

Future affordance research can elaborate on our theoretical premises and extend our VA logic in two ways. First, we expect different types of technologies to appeal to individuals with different personal values depending on their affordances and use context (Karahanna et al., 2018). Additional or different personal values may be relevant for other technologies, and other values frameworks could be used to derive these values. For example, while we used Schwartz et al.'s (2010) personal political values framework to account for the political context of Bitcoin, future research could focus on certain basic personal values (e.g., universalism; Schwartz et al., 2012) that are addressed by the affordances of certain technologies (e.g., environmentally sustainable technologies). Second, future research can elaborate on contextual characteristics that differ across technologies and may affect the relationship between values and affordances. For example, governmental attempts to regulate the use of Bitcoin may create perceptions that discourage individuals from seeing Bitcoin as something that escapes government control. This situation may create a context in which individuals evaluate Bitcoin affordances in a way that does not address the value of free enterprise. Therefore, a worthy avenue for future research is to elaborate on the moderating contextual factors that emerge from the nature of different technologies because such factors can affect the extent to which the VA relationship applies to a particular technology context. We encourage future research to leverage affordances as a theoretical construct to understand the personal values that different technology affordances address.

6.2.2 Values and Technology Use Behavior

We complement the theoretical discourse on how values affect technology use behavior (Salcedo & Gupta, 2021; Srite & Karahanna, 2006; Tams et al., 2020) by (1) theorizing on the

mediating mechanism of affordances linking values and technology use and (2) introducing political values to the IS literature via the context of affordances. First, our study shows that affordances serve as a valuable construct to explain values' effects on Bitcoin use behavior. Recent studies have hypothesized and found direct effects of values, such as basic personal values (Peterson et al., 2010; Tams et al., 2020) and espoused national cultural values (Salcedo & Gupta, 2021), on technology use. Our research goes beyond theorizing on the direct values-use relationship to also theorize on the process underlying why individuals rely on their personal values when making technology use decisions (Jayawardhena, 2004; Lee & Lyu, 2016). In this vein, we use the concept of affordances to propose a new mechanism that translates values into actual behavior, which goes beyond the direct effects of values on technology use hypothesized in previous studies (e.g., Peterson et al., 2010; Salcedo & Gupta, 2021). Thus, we explicate and test the mechanism underlying the values-use relationship (Whetten, 1989). Specifically, we argue and show that values influence use behavior when technologies provide affordances through which users believe they can address their values. This perspective is consistent with previous research showing that values do not influence technology use behavior directly but do so indirectly via individuals' attitudes toward technologies (e.g., attitudes toward technology affordances), which in turn influence their technology use behavior (e.g., Jayawardhena, 2004; Karahanna et al., 2018; Lee & Lyu, 2016). Thus, affordances need to be considered when evaluating why using a technology may cater to a certain set of users' personal values.

Second, we extend values research in IS by introducing values beyond cultural or basic personal values (Hofstede, 1980; Schwartz, 1992) and demonstrating that the personal political values framework (Schwartz et al., 2010) can be used effectively in the IS adoption context. In particular, we show that personal political values can be employed in the Bitcoin context to predict individuals' attitudes toward affordances and their use behavior. Interestingly, the two personal political values underlying libertarian attitudes (i.e., civil liberties and free enterprise) have differential effects on Bitcoin assimilation. While Bitcoin use behavior is indeed predicted

by free enterprise, our findings indicate that valuing reduced governmental control (as indicated by free enterprise) is not what drives individuals' assimilation of Bitcoin and its affordances but that the more fundamental value of protecting individual rights (as indicated by civil liberties) does.

In this regard, our counterintuitive finding that the personal political values (i.e., civil liberties and free enterprise) underlying certain political attitudes (i.e., libertarian attitudes) have differential effects raises the question of how to best capture the spirit of political ideologies and evaluate their effects on technology assimilation. For instance, additional research is needed to determine whether studies should measure a range of particular political values or consider constellations of different political values (i.e., configurations that holistically characterize an individual's political values system). In this vein, an interesting direction for future research would be to take a configurational approach (Misangyi et al., 2017), which contrasts with the variable-focused approach used in this study. While the variable-focused approach focuses on the additive linear net effects of particular individual variables, the configurational approach focuses on the synergistic effect of sets of variables (Mithas et al., 2022). Thus, the configurational approach aims to identify synergistic configurations of different initial conditions and paths (different political values, in our case) that are associated with an expected outcome (technology use behavior, in our case) (Moser et al., 2021). Accordingly, there may be multiple equivalent configurations of an individual's political values hierarchy, all of which may equally have a positive impact on Bitcoin use. As an illustration, Person A, who strongly endorses the political value of civil liberties but endorses the political values of traditional morality and free enterprise less, may view Bitcoin affordances positively. The configurational perspective would argue that Person B, who strongly endorses free enterprise but endorses civil liberties and traditional morality less, may view Bitcoin affordances just as positively. This configurational thinking makes it possible to establish the extent to which different configurations of an individual's political values system have the same or a similar impact on

his or her technology assimilation. Overall, we believe that political values should be considered when investigating why individuals assimilate technologies given that whole ecosystems based on, for example, open source software or blockchain technology are steeped in political values and ideologies (Choi et al., 2015; Tumasjan, 2021; Winner, 1980).

6.2.3 Blockchain, Values, and Political Ideologies

We advance the conversation on how political ideologies shape people's attitudes toward blockchain technology (Bashir et al., 2016; Golumbia, 2016; Hoffman et al., 2020) by introducing blockchain affordances at the individual level and systematically theorizing on why libertarianism may be connected to Bitcoin assimilation. An emerging stream of research has started exploring the effects of political attitudes on how individuals perceive and use Bitcoin and/or public blockchain technology. These exploratory studies have focused on the effects of libertarian attitudes on Bitcoin use intentions and ownership (Bashir et al., 2016) and on how individuals evaluate certain aspects of Bitcoin, such as anonymity, freedom, and banking (Bohr & Bashir, 2014). However, studies have yet to systematically theorize on the "why" underlying the relationship between political ideology (i.e., libertarianism) and Bitcoin assimilation (Whetten, 1989). As called for by recent blockchain research (Rossi et al., 2019), we address this question by theorizing on and testing the underlying mediating mechanism of affordances and showing how individuals' political values guide their actual Bitcoin use behavior. Integrating affordance theory with personal values at the individual level, we directly address open research questions related to how "specific blockchain induced affordances such as decentralization … affect individual adoption" (Risius & Spohrer, 2017, p. 402) and provide evidence that individuals' political values influence their attitudes toward Bitcoin affordances and their Bitcoin use behavior.

Therefore, our study lays the groundwork for future theory-driven research on blockchain technology assimilation. While our study focuses on the very specific context of

Bitcoin using a carefully selected set of values and affordances, future research can draw on our theorizing and investigate the values and affordances that help explain why people assimilate other decentralized technologies and governance mechanisms. For example, decentralized autonomous organizations (DAOs)[9] and their affordances may emerge from different goals and underlying values other than libertarian political values (e.g., values underlying communitarianism) because DAOs are driven by the different shared objectives of their community members of users, developers, and miners (e.g., helping in war, bolstering science, etc.) (Andersen & Ingram Bogusz, 2019; Hsieh et al., 2018). Similarly, permissioned blockchain technology provides affordances that are at odds with the affordances of permissionless blockchain technology (e.g., Bitcoin) because they emerge from the preservation of centralized powers serving as trust anchors rather than single points of failure (Tumasjan, 2022). Consistent with these examples, other blockchain studies have illustrated the general importance of different values and political ideologies not only in the adoption context (Bashir et al., 2016; Tumasjan & Beutel, 2019) but also, for example, in the forking of blockchains (Andersen & Ingram Bogusz, 2019; Islam et al., 2019) and in the branding (Harvey & Branco-Illodo, 2020) and attitudinal positioning (Inwood & Zappavigna, 2021) of blockchain whitepapers. Therefore, we believe future research can build on our VA logic and investigate how and why personal and political values might explain individuals' attitudes toward the affordances of blockchain-based applications that use other governance mechanisms than those used in Bitcoin.

[9] Decentralized autonomous organizations (DAOs), a term coined by Buterin (2014), represent organizations with a high degree of autonomy and decentralized coordination wherein decisions are automatically made by nonhuman agents (i.e., artificial intelligence) after they have been integrated into the focal network (Beck et al., 2018; Buterin, 2014; Hsieh et al., 2018).

6.3 Practical Implications

Our findings provide business professionals, blockchain developers, and blockchain companies, such as cryptocurrency exchanges, insights into the role of political values in individuals' attitudes toward and use of blockchain-based applications. In line with prior research (Harvey & Branco-Illodo, 2020; Inwood & Zappavigna, 2021; Islam et al., 2019), our results underscore the importance of political values as a normative element in shaping attitudes toward blockchain technology. Entrepreneurs and developers who want to launch their own cryptocurrency or blockchain project must therefore reflect on what ideological messages they may convey, especially since political values have also been shown to play a crucial role in the context of new venture financing (Maldonado-Bautista et al., 2021).

Similarly, new political debates revolving around proof-of-work-based cryptocurrencies, such as Bitcoin, should not be ignored in the battle for customers. For example, while our results suggest that users view the affordances of Bitcoin positively through a libertarian values lens, which in turn guides actual Bitcoin use, the increasingly important political discourse around Bitcoin's energy consumption and environmental sustainability may be one reason why some people do *not* have positive attitudes toward Bitcoin affordances (for related work, see De Vries et al., 2022; Mora et al., 2018). Thus, cryptocurrency exchanges should take a clear stance on the political discourse surrounding Bitcoin's power consumption.

6.4 Limitations

Like all research, our study has some limitations. First, we did not control for the political values of blind patriotism and equality because a factor analysis suggested these two constructs should be excluded due to validity issues. Because we assessed personal political values in a variety of countries, it is important to consider that different political histories may result in a wide range of interpretations for some political values (Schwartz et al., 2014). However, in line with prior IS research (Suh et al., 2017; Trenz et al., 2020), we focused on a

demographically diverse sample from different countries to account for the global use of Bitcoin and to ensure our findings are generalizable.

Second, we recognize the inherent limitations stemming from the facts that affordances are numerous and that individuals' perceptions and prioritization of them can change over time (Grgecic et al., 2015). New applications and technological updates to the Bitcoin blockchain might alter users' perceptions of affordances because fundamental modifications to the Bitcoin system can open up new or change existing action possibilities. For example, the Lightning Network (i.e., a routing technology layered on top of the Bitcoin network that allows two parties to exchange bitcoins outside of the Bitcoin blockchain; Antonopoulos, 2018) might change the way users perceive the utility of Bitcoin (e.g., by affording them more efficient and privacy-enhanced bitcoin payments). In this study, we did not explicitly consider these modifications in the Bitcoin system due to their early stage of development and currently limited adoption. Importantly, our conceptualization of Bitcoin affordances captures those features that have endured and been central to Bitcoin since its inception.

7 Conclusion

In this paper, we developed and tested theory that links personal values and affordances via the context of Bitcoin. Our central argument is that certain affordances cater to a set of values and thus challenge our understanding of what motivates people to assimilate a technology because their use behavior essentially entails the endorsement of their personal values. While the well-established concept of functional affordances has greatly advanced our understanding of how technologies can be used in goal-oriented ways, it does not support a values-based analysis of IT artifacts, leaving the important question of why individuals differ in their attitudes toward affordances and thus in their assimilation of technologies unanswered. By theorizing on how people evaluate affordances through a values lens, we offer a novel vantage point to answer this question.

In the context of Nakamoto's (2008a) statement in the opening quote about Bitcoin being attractive to the libertarian viewpoint, our findings reveal that values predict individuals' attitudes toward affordances and that this VA relationship in turn shapes actual use behavior. In particular, we show that individuals high in certain personal values (i.e., libertarian political values) are especially attracted to Bitcoin because it provides users the specific Bitcoin affordances of decentralized self-reliance, verification, value creation, and identity protection.

Building on our theorizing and empirical findings, we set the stage for future theory-developing blockchain research on personal and political values. Moreover, we offer additional important avenues for future IS research by critically examining extant assumptions of affordance research. We hope our study leads to increased theory building and empirical work on this important topic to advance sociotechnical IS and blockchain research.

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Figures and Tables

Table 1. Key Affordances of Bitcoin

Bitcoin affordance	**Definition** An affordance that enables individuals to …	**Focal IT artifact**	**Related literature**
Decentralized self-reliance	… increase their independence from centralized powers. Anybody can use Bitcoin to store value or make transactions independent from central authorities, thereby bypassing financial intermediaries, such as banks.	Distributed public ledgers, proof-of-work consensus mechanism	Hoffman et al. (2020); Nakamoto (2008b); Walch (2019)
Verification	… record and verify the financial activities of a monetary system. Anybody can use Bitcoin to prove the history of transactions.	Distributed public ledgers, public key cryptography	Antonopoulos (2018); Kshetri (2018); Nakamoto (2008b)
Value creation	… participate in new value creation. Anybody can use Bitcoin to engage in a new digital asset and emerging valuable technology.	Distributed public ledgers, proof-of-work consensus mechanism, public key cryptography	Nakamoto (2008b); Swan (2015); Tapscott & Tapscott (2018)
Identity protection	… safeguard their identities. Anybody can use multiple Bitcoin wallet addresses to enhance their privacy compared to traditional online payment systems.	Public key cryptography	Fabian et al. (2016); Kshetri (2018); Nakamoto (2008b)

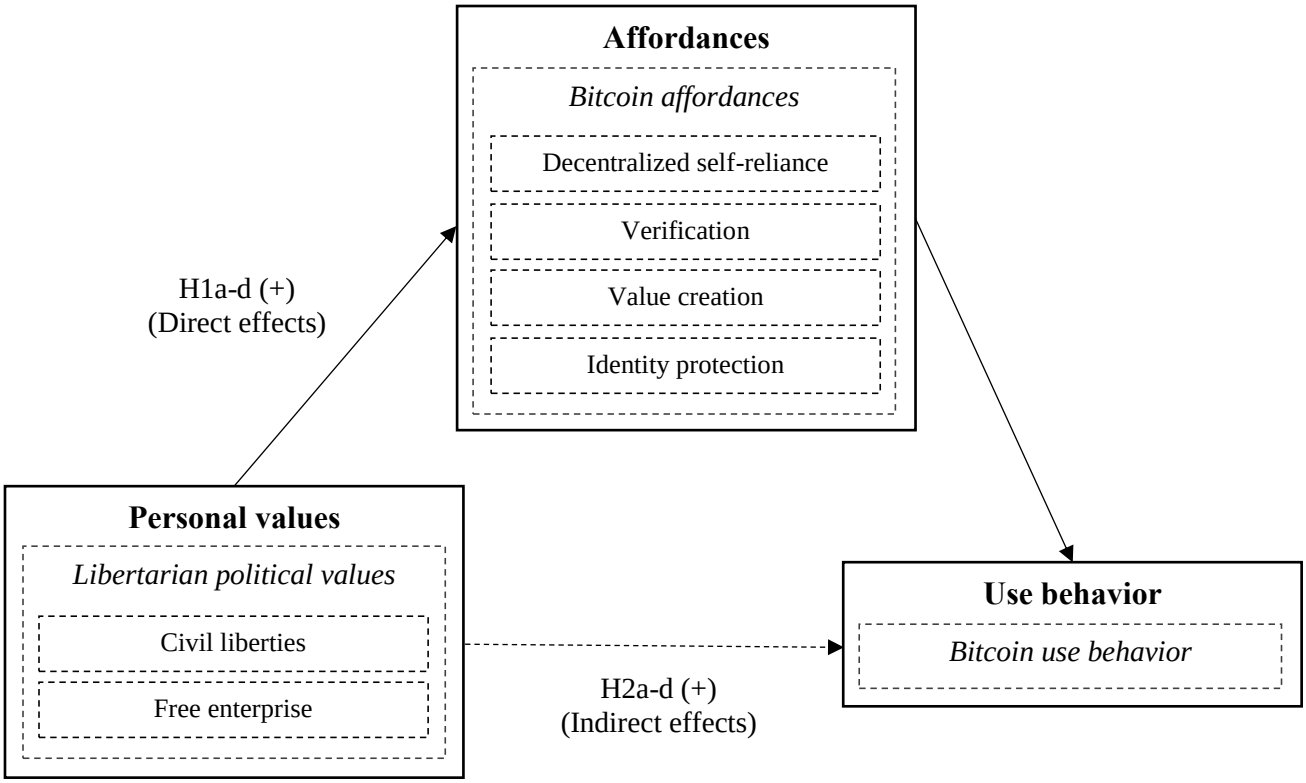


Figure 1. Research Model

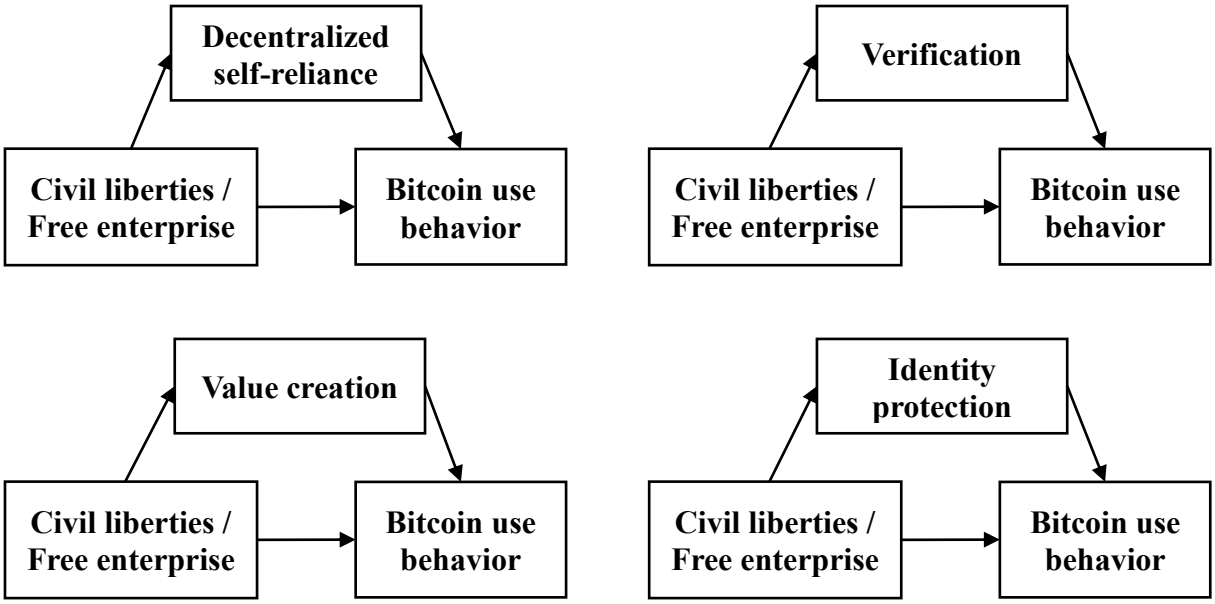
Table 2. Results of Regression Analysis on Bitcoin Affordances

Variables	Model 1		Model 2		Model 3		Model 4	
	Decentralized self-reliance[b]		Verification[b]		Value creation[b]		Identity protection[b]	
	Main effects only	*Main effects including controls*	*Main effects only*	*Main effects including controls*	*Main effects only*	*Main effects including controls*	*Main effects only*	*Main effects including controls*
1. Main effects								
Civil liberties[a]	0.35***	0.21**	0.33***	0.19**	0.40***	0.25***	0.39***	0.21**
Free enterprise[a]	0.21***	0.05	0.25***	0.06	0.14*	-0.03	0.24***	0.02
2. Control variables								
Traditional morality[a]		0.03		0.05		0.02		0.13
Law and order[a]		0.06		0.13		0.07		0.12
Technology self-efficacy[b]		0.32***		0.16*		0.22**		0.23***
Disposition to trust technology[b]		0.05		0.06		0.12*		0.11
Bitcoin knowledge[b]		0.03		-0.03		0.06		0.01
Bitcoin owner[b]		0.15		0.26**		0.21**		0.19*
Non-Western country[a]		0.11		0.08		0.14		0.12
Educational degree[a]		0.13*		0.03		0.06		0.07
Age[a]		0.04		-0.02		-0.02		0.08
Gender[a]		-0.04		0.01		0.04		0.10*
R^2	0.20	0.37	0.21	0.36	0.21	0.39	0.25	0.44

Note: N = 236. We report the standardized regression coefficient beta. To account for the presence of heteroscedasticity, we used HC3 estimators as suggested by Hayes and Cai (2007). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

[a] Measured at time 1 (T1).

[b] Measured at time 2 (T2).



Note: We examined the effects of civil liberties and free enterprise separately.

Figure 2. Simple Mediation Models of Libertarian Political Values, Bitcoin Affordances, and Bitcoin Use Behavior

Table 3. Results of Simple Mediation Tests

Libertarian political values (IV)	**Bitcoin affordances (M)**	**Mediation test (ab)**				**Full/Partial mediation test (c')**				**Mediation (full/partial/none)**
		Indirect effect	SE(HC3)	Bias-corrected 95% CI		Direct effect	SE(HC3)	Bias-corrected 95% CI		
				Lower	Upper			Lower	Upper	
Civil liberties	Decentralized self-reliance	0.12	0.08	-0.01	0.29	0.15	0.29	-0.42	0.72	None
Civil liberties	Verification	0.19	0.09	0.04	0.39	0.07	0.29	-0.50	0.65	Full
Civil liberties	Value creation	0.30	0.11	0.11	0.54	-0.03	0.28	-0.60	0.53	Full
Civil liberties	Identity protection	0.27	0.10	0.09	0.47	-0.002	0.29	-0.58	0.57	Full
Free enterprise	Decentralized self-reliance	0.04	0.04	-0.02	0.12	0.67	0.19	0.29	1.06	None
Free enterprise	Verification	0.09	0.05	0.005	0.20	0.62	0.19	0.25	1.00	Partial
Free enterprise	Value creation	0.02	0.05	-0.08	0.12	0.69	0.19	0.32	1.06	None
Free enterprise	Identity protection	0.06	0.05	-0.04	0.17	0.65	0.19	0.27	1.03	None

Note: To account for the presence of heteroscedasticity, we used HC3 estimators as suggested by Hayes and Cai (2007).

Table 4. Summary of the Hypothesis Tests

Hypothesis	Result	Support
H1: Personal values (i.e., libertarian political values) have positive direct effects on individuals' attitudes toward the four Bitcoin affordances:		
(a) decentralized self-reliance	Positive direct effect of libertarian political values (i.e., civil liberties) on decentralized self-reliance	Supported
(b) verification	Positive direct effect of libertarian political values (i.e., civil liberties) on verification	Supported
(c) value creation	Positive direct effect of libertarian political values (i.e., civil liberties) on value creation	Supported
(d) identity protection	Positive direct effect of libertarian political values (i.e., civil liberties) on identity protection	Supported
H2: Personal values (i.e., libertarian political values) have positive indirect effects on Bitcoin use behavior mediated by the four Bitcoin affordances:		
(a) decentralized self-reliance	No indirect effects of libertarian political values on Bitcoin use behavior mediated by decentralized self-reliance	Not supported
(b) verification	Positive indirect effect of libertarian political values (i.e., civil liberties) on Bitcoin use behavior fully mediated by verification; positive indirect effect of libertarian political values (i.e., free enterprise) on Bitcoin use behavior partially mediated by verification	Supported
(c) value creation	Positive indirect effect of libertarian political values (i.e., civil liberties) on Bitcoin use behavior fully mediated by value creation	Supported
(d) identity protection	Positive indirect effect of libertarian political values (i.e., civil liberties) on Bitcoin use behavior fully mediated by identity protection	Supported

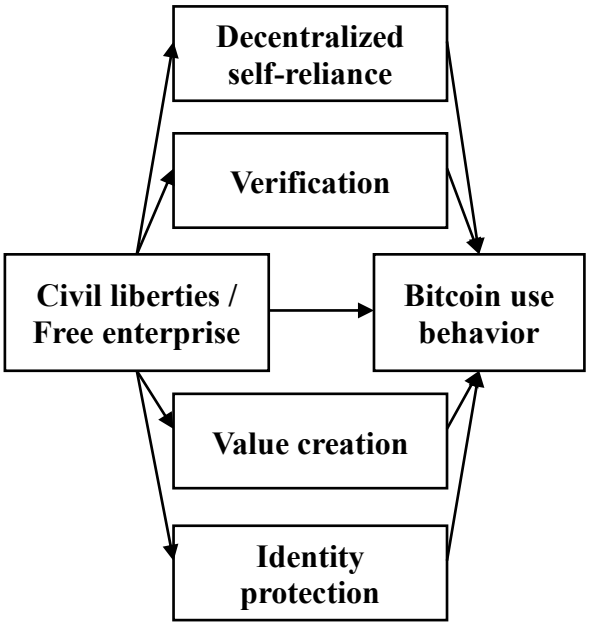
Table 5. Contributions and Implications for Future Research

Research stream	Theoretical discourse	Contributions of this study	Future research directions
Values in IS	Linking values to the materiality of information technology (Cheikh-Ammar, 2018; Markus & Silver, 2008; Snyder et al., 2016)	Advancing research by theorizing on the origin of affordances by (1) showing how affordances emerge from artifacts and values and (2) building theory on why personal values matter for individuals' attitudes toward affordances	Extending our logic of the VA link by (1) using additional or different values (and values frameworks) to investigate technology affordances and (2) elaborating on contextual factors that may influence the VA relationship
Values in IS	Effects of values on technology use behavior (Salcedo & Gupta, 2021; Srite & Karahanna, 2006; Tams et al., 2020)	Complementing research on values-based IS adoption by (1) theorizing on the mediating mechanism of affordances linking values and use and (2) introducing political values to the IS literature via the context of affordances	Following a configurational (rather than a variable-focused) perspective to account for the complexity of individuals' political values systems and identify different configurations of political values associated with technology use
Blockchain technology	The role of political ideologies in blockchain technology assimilation (Golumbia, 2016; Lawrence & Mudge, 2019; Tumasjan, 2021)	Advancing blockchain research by (1) introducing affordances at the individual level to the blockchain literature and (2) systematically theorizing on why libertarianism may be connected to Bitcoin and its affordances	Developing and testing our VA theory beyond Bitcoin on blockchain-based applications that use other governance mechanisms

Appendix A: Post Hoc Analyses

We conducted post hoc analyses to test (1) whether there are overall mediating effects when the specific mediating effects of each affordance are added together (using parallel mediation analysis), (2) whether those who adopt versus do not adopt Bitcoin place a higher weight on libertarian political values and Bitcoin affordances, and (3) whether there are direct and/or indirect effects of personal political values other than libertarian political values.

First, to understand whether there are overall mediating effects when the specific mediating effects of each affordance are added together, as well as which of the four affordance dimensions are the dominant mediating variables in the relationship between libertarian political values and Bitcoin use behavior, we also tested parallel multiple mediation models (see Figure A and Table A) (Preacher & Hayes, 2008).



Note: We examined the effects of civil liberties and free enterprise separately.

Figure A. Parallel Multiple Mediation Models of Libertarian Political Values, Bitcoin Affordances, and Bitcoin Use Behavior

Table A. Results of Parallel Mediation Tests

Libertarian political values (IV)	**Bitcoin affordances (M)**	**Mediation test (ab)**				**Full/Partial mediation test (c')**				**Mediation (full/partial/none)**
		Indirect effect	SE(HC3)	Bias-corrected 95% CI		Direct effect	SE(HC3)	Bias-corrected 95% CI		
				Lower	Upper			Lower	Upper	
Civil liberties	Decentralized self-reliance	0.01	0.08	-0.14	0.19	-0.10	0.29	-0.67	0.46	None
Civil liberties	Verification	0.04	0.09	-0.13	0.23	-0.10	0.29	-0.67	0.46	None
Civil liberties	Value creation	0.18	0.12	-0.02	0.44	-0.10	0.29	-0.67	0.46	None
Civil liberties	Identity protection	0.14	0.10	-0.04	0.36	-0.10	0.29	-0.67	0.46	None
Civil liberties	Total indirect effect	0.37	0.11	0.16	0.61	-0.10	0.29	-0.67	0.46	Full
Free enterprise	Decentralized self-reliance	0.004	0.03	-0.05	0.07	0.65	0.20	0.26	1.03	None
Free enterprise	Verification	0.02	0.04	-0.06	0.11	0.65	0.20	0.26	1.03	None
Free enterprise	Value creation	0.01	0.03	-0.05	0.08	0.65	0.20	0.26	1.03	None
Free enterprise	Identity protection	0.03	0.04	-0.03	0.13	0.65	0.20	0.26	1.03	None
Free enterprise	Total indirect effect	0.06	0.07	-0.07	0.21	0.65	0.20	0.26	1.03	None

Note: To account for the presence of heteroscedasticity, we used HC3 estimators as suggested by Hayes and Cai (2007). Shaded rows show the mediation effect that results when all specific indirect effects (i.e., the mediating effect of a specific Bitcoin affordance while accounting for the shared variance with the other affordance mediators) are summed.

Parallel multiple mediation tests capture (a) the specific indirect effect (i.e., the mediating effect of a specific mediator while accounting for the shared variance with the other mediators) and (b) the total indirect effect (i.e., the sum of all specific indirect effects) (Hayes, 2018; Preacher & Hayes, 2008). Table A shows that there are no specific indirect effects of libertarian political values on Bitcoin use behavior. The absence of significant mediating effects of the affordances could be due to the fact that examining correlated mediators increases the sample variance and reduces power when testing for specific indirect effects (Hayes, 2018). Thus, the greater sampling variance due to correlated mediators can compromise the significance of specific indirect effects and might thus serve to explain why we did not find specific mediation effects in contrast to the simple mediation tests (Hayes, 2018). However, the sum of the specific indirect effects provides evidence of a total indirect effect of civil liberties on use that is fully transmitted by all four affordances simultaneously. This means that the small nonsignificant mediation effects of the individual affordances added together are strong enough to show a significant total mediation effect. In other words, considering the total fully mediating effect of all four affordances (i.e., the sum of each affordance's specific indirect effect), our data show a mediation chain between civil liberties, Bitcoin affordances, and Bitcoin use behavior.

Second, to test whether individuals who adopt versus do not adopt Bitcoin attach more importance to (a) libertarian political values and (b) the Bitcoin affordances, we compared values and attitudes toward affordances between individuals who have and have not owned bitcoins. Conducting t-tests for the four political values shows statistically significant group differences (civil liberties: $t(90.39) = -3.00$, $p < 0.01$, free enterprise: $t(158.36) = -6.07$, $p < 0.001$, traditional morality: $t(234) = -2.05$, $p < 0.05$, law and order: $t(234) = -2.87$, $p < 0.01$). However, while the effect sizes (Cohen's d) for the libertarian political values are moderate (i.e., $0.50 \geq d < 0.80$; civil liberties: $d = 0.51$, free enterprise: $d = 0.78$), the effect sizes for the other political values are rather small (i.e., $0.20 \geq d < 0.50$; traditional morality: $d = 0.30$, law

and order: d = 0.41) (Cohen, 1988). These results suggest that (a) bitcoin owners attach substantially more importance to libertarian political values than individuals who have never owned bitcoins and (b) these group differences between owners and nonowners are larger for libertarian political values than for the other political values. Furthermore, as evident from Table 2, our results show that bitcoin ownership predicts individuals' attitudes toward the affordances of verification (beta = 0.26, $p < 0.01$), value creation (beta = 0.21, $p < 0.01$), and identity protection (beta = 0.19, $p < 0.05$), but not decentralization (beta = 0.15, $p = 0.07$). Taken together, our results indicate that owning bitcoins versus not owning bitcoins is associated with both holding higher levels of libertarian political values and more positive attitudes toward the affordances of Bitcoin.[10]

Third, we also tested whether there are direct and indirect effects of other personal political values (i.e., traditional morality, law and order) to see if libertarian political values have stronger effects than these other values. As is evident from Table 2, traditional morality and law and order show no direct effects on individuals' attitudes toward the Bitcoin affordances, demonstrating that the libertarian political value of civil liberties represents the strongest predictor of all four Bitcoin affordances when compared to the other personal political values. Furthermore, traditional morality and law and order had no direct effect on Bitcoin use behavior. We also tested whether traditional morality and law and order show simple or parallel mediated effects on Bitcoin use behavior via affordances. No mediation chain was found between these personal political values, affordances, and use behavior. Thus, our data indicate that, whereas libertarian political values have direct and indirect effects on Bitcoin use behavior, respectively, the other political values neither show direct nor indirect effects. In other words, only libertarian political values are related to Bitcoin affordances and Bitcoin use behavior when compared to the other personal political values.

[10] The results are the same when examining the differences between current and non-current bitcoin owners.

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Appendix B: Literature Review and Prestudy of the Bitcoin Affordances

Table B1. Literature on Blockchain Attributes

Year	Author(s)	Title	Outlet	Attributes
2008	Nakamoto, S.	Bitcoin: A peer-to-peer electronic cash system	https://bitcoin.org/bitcoin.pdf	*1. No central authority* *2. Proof-of-work* *3. Privacy*
2013	Buterin, V.	A next generation smart contract and decentralized application platform	https://ethereum.org/en/whitepaper/	*1. Simplicity* *2. Universality* *3. Modularity* *4. Agility* *5. Nondiscrimination and noncensorship*
2015	Glaser, F., & Bezzenberger, L.	Beyond cryptocurrencies: A taxonomy of decentralized consensus systems	Proceedings of the 23rd European Conference on Information Systems (ECIS)	*1. Underlying* *2. Valuation* *3. Community* *4. Service focus* *5. Code base* *6. Token usage*
2015	Swan, M.	Blockchain: Blueprint for a new economy	O'Reilly	*1. Disintermediation* *2. Decentralization* *3. Trustlessness*
2016	Beck, R., Czepluch, J. S., Lollike, N., & Malone, S.	Blockchain: The gateway to trust-free cryptographic transactions	Proceedings of the 24th European Conference on Information Systems (ECIS)	*1. Trust free* *2. Transparent* *3. Highly secure*
2016	Fabian, B., Ermakova, T., & Sander, U.	Anonymity in Bitcoin: The users' perspective	Proceedings of the 37th International Conference on Information Systems (ICIS)	*1. Anonymity* *2. Pseudonymity*
2016	Pilkington, M.	Blockchain technology: Principles and applications	In F. Olleros & M. Zhegu (Eds.), Research handbook on digital transformations (pp. 225-253). Edward Elgar Publishing	*1. Protocol for sending, receiving and recording value* *2. Internet-based value containers: Coins or tokens* *3. Incentives for collaborative effort* *4. Open source licenses and governance mechanisms* *5. Immutability of the system*

Table B1. Continued

2016	Underwood, S.	Blockchain beyond Bitcoin	Communications of the ACM, 59(11), 15-17	*1. Immutability* *2. Transparency* *3. Trustlessness* *4. Security* *5. Fast* *6. Disintermediation* *7. No central authority*
2016	Walsh, C., O'Reilly, P., Gleasure, R., Feller, J., Li, S., & Cristoforo, J.	New kid on the block: A strategic archetypes approach to understanding the blockchain	Proceedings of the 37th International Conference on Information Systems	1. *Level of permission restrictions* 2. *Level of restricted public access to data* 3. *Level of investment-weighting for transaction consensus* 4. *Level of chain modularity* 5. *Level of scalability* 6. *Level of interoperability* 7. *Level of centralized regulation* 8. *Level of anonymity*
2016	Yli-Huumo, J., Ko, D., Choi, S., Park, S., & Smolander, K.	Where is current research on blockchain technology? A systematic review	PLoS ONE, 11(10), 1-27	*1. No governmental control* *2. Transparency* *3. Anonymity* *4. Privacy* *5. Security*
2017	Atzori, M.	Blockchain technology and decentralized governance: Is the state still necessary?	Journal of Governance and Regulation, 6(1), 45-62	*1. Decentralized trust* *2. Blockchain-based governance*
2017	Conte de Leon, D., Stalick, A. Q., Jillepalli, A. A., Haney, M. A., & Sheldon, F. T.	Blockchain: Properties and misconceptions	Asia Pacific Journal of Innovation and Entrepreneurship, 11(3), 286-300	*1. Ordered* *2. Incremental* *3. Sound* *4. Digital*
2017	Dinh, T. T. A., Liu, R., Zhang, M., Chen, G., Ooi, B. C., & Wang, J.	Untangling blockchain: A data processing view of blockchain systems	IEEE Transactions on Knowledge and Data Engineering, 30(7), 1366-1385	*1. Distributed ledger* *2. Consensus* *3. Cryptography* *4. Smart contracts*

Table B1. Continued

2017	Glaser, F.	Pervasive decentralization of digital infrastructures: A framework for blockchain enabled system and use case analysis	Proceedings of the 50th Hawaii International Conference on System Sciences (HICSS)	*1. Decentralization* *2. Cryptography* *3. Smart contracts*
2017	Hofmann, F., Wurster, S., Ron, E., & Bohmecke-Schwafert, M.	The immutability concept of blockchains and benefits of early standardization	Proceedings of the 2017 ITU Kaleidoscope	*1. Immutability*
2017	Iansiti, M., & Lakhani, K. R.	The truth about blockchain	Harvard Business Review, 95(1), 118-127	*1. Distributed database* *2. Peer-to-peer transmission* *3. Transparency with pseudonymity* *4. Irreversibility of records* *5. Computational logic*
2017	Morabito, V.	Business innovation through blockchain: The b³ perspective	Springer	*1. Decentralization* *2. Trust and provenance* *3. Resilience and irreversibility*
2017	Risius, M., & Spohrer, K.	A blockchain research framework	Business & Information Systems Engineering, 59(6), 385-409	*1. Trust* *2. Decentralization* *3. Transaction speed* *4. Security* *5. Auditability*
2017	Seebacher, S., & Schüritz, R.	Blockchain technology as an enabler of service systems: A structured literature review	Proceedings of the 8th International Conference on Exploring Service Science (IESS)	*1. Trust* *2. Shared and public* *3. Low friction* *4. Peer verification* *5. Cryptography* *6. Immutability* *7. Decentralization* *8. Pseudonymity* *9. Redundancy* *10. Versatility* *11. Automation*
2017	Wüst, K., & Gervais, A.	Do you need a blockchain?	Proceedings of the 2018 Crypto Valley Conference on Blockchain Technology	*1. Public verifiability* *2. Transparency* *3. Privacy* *4. Integrity* *5. Redundancy* *6. Trust anchor*

Table B1. Continued

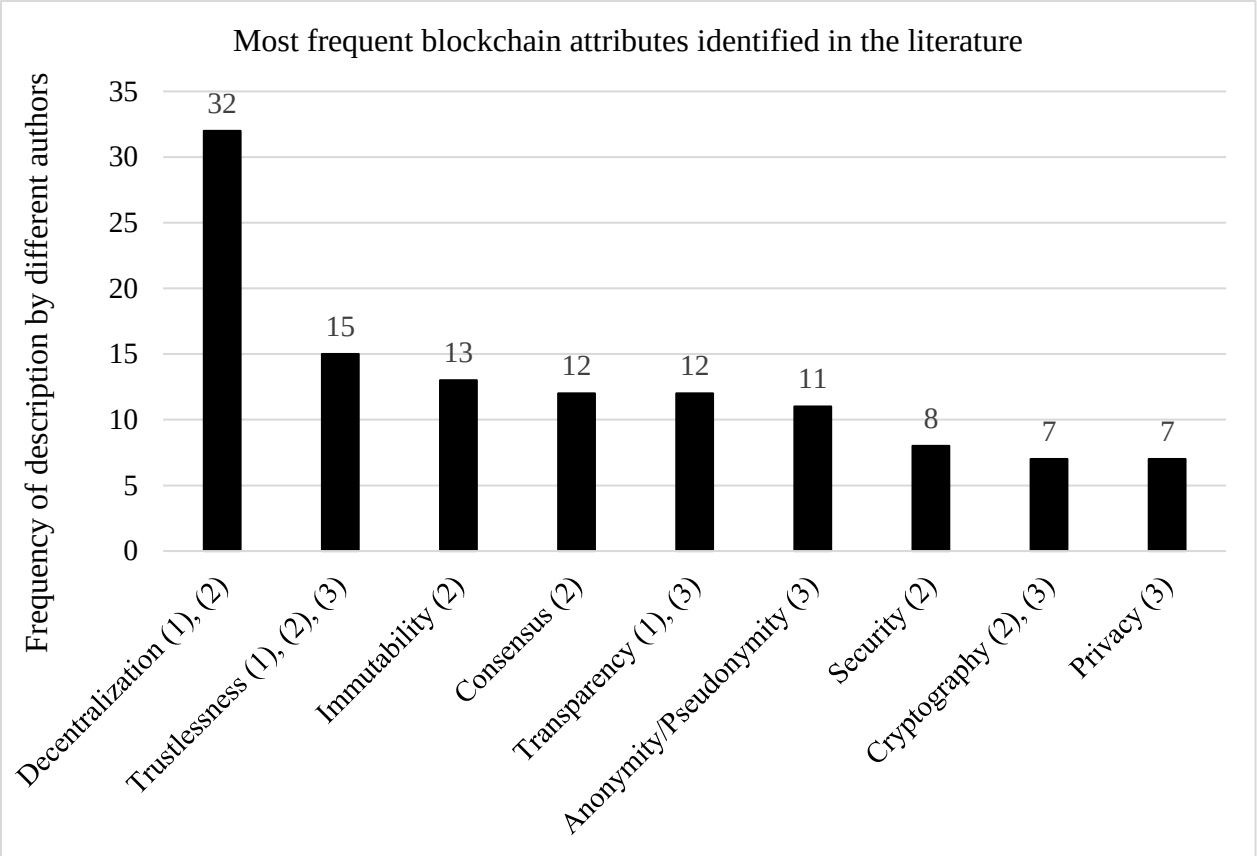
2017	Xu, X., Weber, I., Staples, M., Zhu, L., Bosch, J., Bass, L., Pautasso, C., & Rimba, P.	A taxonomy of blockchain-based systems for architecture design	Proceedings of the 2017 IEEE International Conference on Software Architecture (ICSA)	*1. Immutability* *2. Nonrepudiation* *3. Integrity* *4. Transparency* *5. Equal rights* *6. Trust*
2018	Antonopoulos, A. M.	Mastering Bitcoin: Programming the open blockchain	O'Reilly	*1. Decentralized consensus, trust and control* *2. Ownership attestation* *3. Cryptographic-proof security*
2018	Davidson, S., de Filippi, P., & Potts, J.	Blockchains and the economic institutions of capitalism	Journal of Institutional Economics, 62, 1-20	*1. Cryptography* *2. Consensus* *3. Decentralization* *4. Trust*
2018	Friedlmaier, M., Tumasjan, A., & Welpe, I. M.	Disrupting industries with blockchain: The industry, venture capital funding, and regional distribution of blockchain ventures	Proceedings of the 51st Annual Hawaii International Conference on System Sciences (HICSS)	*1. Decentralization* *2. Consensus* *3. Cryptography*
2018	Kshetri, N.	Cryptocurrencies: Transparency versus privacy	Computer, 51(11), 99-111	*1. Transparency* *2. Privacy*
2018	Salviotti, G., Rossi, L. M., & Abbatemarco, N.	A structured framework to assess the business application landscape of blockchain technologies	Proceedings of the 51st Annual Hawaii International Conference on System Sciences (HICSS)	*1. Distributed computation* *2. Public key cryptography* *3. Decentralized consensus*
2018	Sarkintudu, S. M., Ibrahim, H. H., & Abdwahab, A. B.	Taxonomy development of blockchain platforms: Information systems perspectives	AIP Conference Proceedings	*1. Mode of operation* *2. Visibility* *3. Task* *4. Design architecture* *5. Consensus mechanism*
2018	Sultan, K., Ruhi, U., & Lakhani, R.	Conceptualizing blockchains: Characteristics & applications	Proceedings of the 11th IADIS International Conference Information Systems	*1. Immutable* *2. Decentralized* *3. Consensus driven* *4. Transparent*

Table B1. Continued

2018	Tapscott, D., & Tapscott, A.	Blockchain revolution: How the technology behind Bitcoin and other cryptocurrencies is changing the world	Penguin	*1. Networked integrity* *2. Distributed power* *3. Value as incentive* *4. Security* *5. Privacy* *6. Rights preserved* *7. Inclusion*
2018	Zheng, Z., Xie, S., Dai, H. N., Chen, X., & Wang, H.	Blockchain challenges and opportunities: A survey	International Journal of Web and Grid Services, 14(4), 1-25	*1. Decentralization* *2. Persistency* *3. Anonymity* *4. Auditability*
2019	Casino, F., Dasaklis, T. K., & Patsakis, C.	A systematic literature review of blockchain-based applications: Current status, classification and open issues	Telematics and Informatics, 36, 55-81	*1. Consensus mechanism* *2. Identity* *3. Anonymity* *4. Protocol efficiency & consumption* *5. Immutability* *6. Ownership & management* *7. Transaction approval*
2019	Lu, Y.	The blockchain: State-of-the-art and research challenges	Journal of Industrial Information Integration, 15, 80-90	*1. Decentralization* *2. Detrusting* *3. Transparency* *4. Traceable & unforgeable* *5. Anonymity* *6. Credibility*
2019	Tasca, P., & Tessone, C. J.	A taxonomy of blockchain technologies: Principles of identification and classification	Ledger, 4, 1-43	*1. Decentralization of consensus* *2. Transparency* *3. Security* *4. Immutability* *5. Automation and smart contracts* *6. Storage*
2019	Walch, A.	Deconstructing "decentralization": Exploring the core claim of crypto system	In C. Brummer (Ed.), Cryptoassets: Legal, regulatory, and monetary perspectives (pp. 39-68). Oxford University Press	*1. Decentralization*
2020	Clohessy, T., Treiblmaier, H., Acton, T., & Rogers, N.	Antecedents of blockchain adoption: An integrative framework	Strategic Change, 29(5), 501-515	*1. Pseudonymity* *2. Immutability* *3. Access privileges*

Table B1. Continued

2020	Ferdous, M. S., Chowdhury, M. J. M., Hoque, M. A., & Colman, A.	Blockchain consensus algorithms: A survey (Elektronic Working Paper arXiv:2001.07091v2)	Cornell University	1. *Distributed consensus on the chain state* 2. *Immutability and irreversibility of chain state* 3. *Data (transaction) persistence* 4. *Data provenance* 5. *Distributed data control* 6. *Accountability and transparency*
2020	Heister, S., & Yuthas, K.	The blockchain and how it can influence conceptions of the self	Technology in Society, 60, Article 101218	1. *Anonymity* 2. *Privacy* 3. *Immutability* 4. *Trustlessness*
2020	Hoffman, M., Ibáñez, L.-D., & Simperl, E.	Toward a formal scholarly understanding of blockchain-mediated decentralization: A systematic review and a framework	Frontiers in Blockchain, 3(35), 1-18	1. *Decentralized control* 2. *Tamper-proof* 3. *Trustless*
2020	Kannengießer, N., Lins, S., Dehling, T., & Sunyaev, A.	Trade-offs between distributed ledger technology characteristics	ACM Computing Surveys, 53(2), Article 42	1. *Flexibility* 2. *Opaqueness* 3. *Policy* 4. *Performance* 5. *Practicality* 6. *Security*
2020	Lumineau, F., Wang, W., & Schilke, O.	Blockchain governance: A new way of organizing collaborations?	Organization Science, Articles in Advance, 1-22	1. *Decentralized consensus* 2. *Machine-based automation*
2020	Werner, F., Basalla, M., Schneider, J., Hays, D., & vom Brocke, J.	Blockchain adoption from an interorganizational systems perspective: A mixed-methods approach	Information Systems Management 38(2), 1-16	1. *Traceability* 2. *Immutability* 3. *Decentralization* 4. *Security* 5. *Faster and cheaper transactions* 6. *Tokenization of assets* 7. *Crypto tokens for transactions* 8. *Creating trust among unknown parties*



Note: The focal IT artifacts of Bitcoin are (1) distributed public ledgers, (2) proof-of-work consensus mechanism, and (3) public key cryptography. For parsimony, we only report attributes that were described by at least five different authors.

Figure B. Summary of the Most Frequent Blockchain Attributes Identified in the Literature

Table B2. Sociodemographic Data of Consulted Experts

Expert	Age	Gender	Education degree	Education background	Job position	Blockchain expertise
1	27	Male	PhD candidate	Computer science	Researcher at a blockchain research group	Data analytics of public blockchains
2	40	Male	Doctoral degree	Business informatics	Head of a blockchain research center	General implications of blockchain technology
3	44	Male	Master's degree	Finance	Co-founder and CFO of a blockchain company	Blockchain business applications, tokenization
4	25	Male	Master's degree	Business informatics	Blockchain architect at a blockchain company	Blockchain system design, self-sovereign identity
5	30	Male	Master's degree	Automotive engineering	Co-founder and CTO of a blockchain investment platform	Blockchain product development
6	26	Male	PhD candidate	Economics	Researcher at a blockchain research center	Cryptocurrencies and central bank digital currencies
7	25	Male	Master's degree	Management	Blockchain architect at a blockchain company	Token design, technical concepts, business models

Appendix C: Instrument Development and Pretest

Table C1. Pretest Composite Reliability, Convergent Validity, Discriminant Validity

	CR	AVE	MSV	1) Decentralized self-reliance	2) Verification	3) Value creation	4) Identity protection
1) Decentralized self-reliance	0.88	0.56	0.50	**0.75**	-	-	-
2) Verification	0.94	0.75	0.49	0.63	**0.86**	-	-
3) Value creation	0.91	0.66	0.50	0.70	0.70	**0.81**	-
4) Identity protection	0.94	0.83	0.45	0.65	0.47	0.67	**0.91**

Note: CR = Composite reliability, AVE = Average variance extracted, MSV = Maximum shared variance. Square root of AVE bolded in diagonals above interconstruct correlations. We demonstrate construct reliability and validity of the items using the thresholds for composite reliability (CR > 0.70), convergent validity (AVE > 0.50), and discriminant validity (MSV < AVE, square root of AVE greater than interconstruct correlations) as recommended by Hair et al. (2019).

Table C2. Pretest Factor Loadings

Dimension	Item	Item text Bitcoin offers me the possibility to …	Factor loading
Decentralized self-reliance	DEC1	... be involved in a decentralized community.	0.72
	DEC2	... bypass traditional financial intermediaries (e.g., banks).	0.69
	DEC3	... participate in a financial system that reduces the dependence on centralized power structures.	0.84
	DEC4	... resist government censorship.	0.62
	DEC5	... be more independent of centralized structures.	0.68
	DEC6	... make tamper-proof transactions independent from centralized authorities.	0.74
Verification	VER1	... make verifiable transactions.	0.82
	VER2	... prove the current state of transactions.	0.90
	VER3	... record the financial activities of a monetary system.	0.69
	VER4	... use a payment system anybody can verify.	0.84
	VER5	... validate all transaction history.	0.90
Value creation	VAL1	... expand my assets.	0.70
	VAL2	... increase my wealth.	0.81
	VAL3	... take part in new value creation.	0.89
	VAL4	... not suffer from inflation.	0.72
	VAL5	... participate in an emerging valuable technology.	0.80
Identity protection	IDE1	... personally safeguard important information.	0.66
	IDE2	... secure identity information from others.	0.88
	IDE3	... protect my identity.	1.01

Note: The factor loadings represent regression coefficients rather than correlation coefficients because we used the maximum likelihood method with an oblique rotational technique (promax) to account for correlation between the factors (Pedhazur & Schmelkin, 1991).

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Appendix D: Detecting and Deterring Careless Responses in Web-Based Surveys

We applied measures to account for potential inattentiveness issues in web-based data collection as suggested in the extant literature (Huang et al., 2012; Lowry et al., 2016; Meade & Craig, 2012). First, we directly tested for careless responses by including two instructed attentiveness items in the values sections at T1 and one in the affordance section at T2 (Goldammer et al., 2020; Meade & Craig, 2012; Tams et al., 2020). These instructed items were mixed in with the regular items of each scale and were intentionally worded and laid out similarly to the surrounding items. For example, some political values items start with "The government should …" so we made sure to word our attentiveness item the same way: "The government should tighten, never mind, please respond with 'Completely disagree'."

Second, we used indirect measures to detect careless responding by calculating longstring values (i.e., the maximum number of identical consecutive responses) and intra-individual response variability (IRV, i.e., "the standard deviation of responses across a set of consecutive item responses for an individual"; Dunn et al., 2018, p. 108), as recommended by Goldammer et al. (2020). The longstring and IRV techniques rely on the assumption that careful respondents will choose different response options for dissimilar items (DeSimone et al., 2015; Dunn et al., 2018). Thus, we indirectly measured invariant response patterns that indicated a lack of effort due to high longstring or low IRV index values (Dunn et al., 2018; Meade & Craig, 2012). We applied standard deviation analysis to identify invariant respondents with high longstring and low IRV index values in terms of error outliers as recommended by Aguinis et al. (2013). Based on the results, we excluded 32 participants from the sample.

Third, we calculated the response time per item for both questionnaires by dividing the time to complete an entire questionnaire by the number of all items in that questionnaire. Following Huang et al. (2012), we tested whether a participant's response time fell below the

absolute minimum required to read an item and choose an appropriate response option (i.e., 2 seconds per item). No participant had to be dropped from the sample as a result of the findings. Taking into account our strictly designed attentiveness items, our careless response rate (35.40%) is comparable to similar studies using anonymous online panels (Goldammer et al., 2020; Harms & DeSimone, 2015).

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Appendix E. Measurement Model

Table E1. Measurement Items and Factor Loadings of Bitcoin Affordances

Dimension	Item	Item text Bitcoin offers me the possibility to …	Factor loading
Decentralized self-reliance	DEC1	... be involved in a decentralized community.	0.69
	DEC2	... bypass traditional financial intermediaries (e.g., banks).	0.66
	DEC3	... participate in a financial system that reduces the dependence on centralized power structures.	0.73
	DEC4	... resist government censorship.	0.75
Verification	VER1	... make verifiable transactions.	0.86
	VER2	... prove the current state of transactions.	0.81
	VER3	... record the financial activities of a monetary system.	0.75
Value creation	VAL1	... expand my assets.	0.85
	VAL2	... increase my wealth.	0.96
	VAL3	... take part in new value creation.	0.71
Identity protection	IDE1	... personally safeguard important information.	0.69
	IDE2	... secure identity information from others.	0.80
	IDE3	... protect my identity.	0.70

Note: The factor loadings represent regression coefficients rather than correlation coefficients because we used the maximum likelihood method with an oblique rotational technique (promax) to account for correlation between the factors (Pedhazur & Schmelkin, 1991).

Table E2. Composite Reliability, Convergent Validity, Discriminant Validity

Construct	CR	AVE	MSV	1) DEC	2) TRA	3) VAL	4) PRI	5) CL	6) FE
1) DEC	0.82	0.53	0.51	**0.73**	-	-	-	-	-
2) VER	0.90	0.75	0.72	0.71	**0.87**	-	-	-	-
3) VAL	0.92	0.79	0.64	0.63	0.74	**0.89**	-	-	-
4) IDE	0.89	0.73	0.72	0.66	0.85	0.80	**0.86**	-	-
5) CL	0.79	0.56	0.29	0.50	0.48	0.50	0.54	**0.75**	-
6) FE	0.84	0.57	0.15	0.36	0.38	0.28	0.39	0.31	**0.76**

Note: DEC = Decentralized self-reliance, VER = Verification, VAL = Value creation, IDE = Identity protection, CL = Civil liberties, FE = Free enterprise, CR = Composite reliability, AVE = Average variance extracted, MSV = Maximum shared variance. Square root of AVE bolded in diagonals above interconstruct correlations. We demonstrate construct reliability and validity of the items using the thresholds for composite reliability (CR > 0.70), convergent validity (AVE > 0.50), and discriminant validity (MSV < AVE, square root of AVE greater than interconstruct correlations) as recommended by Hair et al. (2019).

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