Can Blockchain Manage Trust in Organizations?

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David De Cremer and Yan Pang illuminate both the limitations and the potential of blockchain technology as the new currency of trust in organizational life. They have found that building trust within organizations requires leaving room for vulnerability, which makes blockchain unsuitable. For building trust between organizations, however, blockchain technology shows more promise because it acts as a regulatory middleman.

In today's volatile and uncertain business environment, organizations must be fast and agile in decision and action. Schoemaker, Heaton, and Teece note that organizations today must be aware of how volatile and complex the business environment is in the short term, while simultaneously taking a long view. If top managers fail in this task, their organizations "may not be prepared when surprising events call for change."[1] Organizations that take an explorative approach to using fast, accurate technology to efficiently manage their functions will be better equipped to handle this challenge. Indeed, as Birkinshaw noted, "technological innovation inspires new approaches to management."[2] New technological approaches will help companies to navigate an ever changing world.

Blockchain is one technology that could be beneficial. As Iansiti and Lakhani put it, "virtually everyone has heard the claim that blockchain will revolutionize business and redefine companies."[3] Scholars have suggested that blockchain, which is the underlying technology of such applications as Bitcoin, is already poised to radically change the nature of our companies. Blockchain could be used, among other things, to perform basic management functions in general and more specifically to motivate employees.[4] A 2019 Deloitte survey of 1,386 senior executives in twelve nations revealed that it is not just scholars who believe blockchain technology can revolutionize our organizations, it is also those who lead them.[5]

Executives believe that blockchain technology can be broadly applied to the management and leadership of organizations.

The survey focused specifically on the potential value that executives see in blockchain technology. Although blockchain was first applied to the cryptocurrency industry and then more generally to the financial sector, the survey found that executives see it moving in the direction of general management. Eighty-three percent of senior executives indicated that they see compelling ways for blockchain to be used in their organizations. Eighty-six percent of those executives believe that blockchain technology can be broadly applied to the management and leadership of organizations, while 53 percent, as of 2019, already see such applications as a priority.

This hype about blockchain as the new currency of trust is built largely on the technology's ability to generate accountability, and thus trust, from almost nothing.

Blockchain Technology as a Driver of Trust

Many experts, then, expect blockchain technology to be an invaluable tool in optimizing business performance by facilitating management and establishing greater trust.[6] Indeed, in 2015, The Economist ran a cover story about blockchain, calling it "the trust machine."[7] This hype about blockchain as the new currency of trust is built largely on the technology's ability to generate accountability from almost nothing. Blockchain technology can thus provide valuable input for the promotion and regulation of trust in an organization.

Executives responding to the 2019 Deloitte survey indicated that blockchain technology was introducing new ways of recording and managing information about business transactions, individual employees, and their interactions. They could then use the resulting improved information about how employees work, collaborate, and fulfil contracts to turn the company's focus toward optimization and creating greater value. According to Hawlitschek, Notheisen, and Teubner, "blockchain technology is said to facilitate 'the exchange of value'"[8] In the management of organizations, blockchain technology's potential to create organizational value, in part by offering a new currency of trust, is widely recognized. Indeed, organizations perform better and create more value for stakeholders when managers promote a trusting work culture.

Behavioral research shows that organizations whose employees trust each other reap many benefits.

What Trust Does and Why

To make organizations effective, it is imperative that mangers build the right work culture, allowing employees to create value for all their stakeholders. Within such a culture, employees work to promote performance and enhance the organization's overall effectiveness. And trust matters! Indeed, within the literature of organizational behavior and management (particularly from the largely behavioral perspective), trust has been found to be critical both as a social lubricant or glue that facilitates cooperation between group members, and in allowing whole organizations to function effectively.[9] Behavioral research shows that organizations whose employees trust each other reap many benefits. People who trust their

colleagues and managers are more likely to cooperate, share information, feel happier, and be satisfied with their jobs and their relationships.[10] In short, the whole organization performs better.[11]

Trust, then, is an important resource which management should actively encourage. The absence of trust costs the organization dearly, making interactions difficult and expensive. Without trust, transaction costs go up, employees are less prone to sharing information, and organizational dynamics, now colored by suspicion, slow down, suppressing the company's growth.[12]

So trust is a positive organizational resource that promotes the growth of the right dynamics in a company. But why is trust so important? One of the most used definitions of trust in the behavioural sciences, refers to it as "a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another."[13] This definition is especially relevant when we talk about the challenge of managing trust within the organization. As employees develop relationships with their colleagues, both within and between departments, those social dynamics contribute to an overall trusting work climate.

People can only develop trust when there is an element of risk in their relationships.

Building on Rousseau et al.'s definition, we have identified several important qualities of the trust which interacting parties develop, and which we refer to as voluntary interpersonal trust. Understanding these qualities allows us to assess whether blockchain technology can effectively be applied to managing trust within organizations.

First, trust entails the social expression of one's positive expectations of others. Interacting parties who trust one another expect that each will be honest and reliable and thus not threaten one another's interests.[14] With these positive expectations eliminating the fear of being exploited, all are willing to cooperate. Second, trust can only be built when people are vulnerable to each other's actions, and being vulnerable means running the risk of being hurt or exploited. Put another way, people can only develop trust when there is an element of risk in their relationships. The decision to make themselves vulnerable to others is considered a key element in employees developing mutual trust.[15]

A behavioral analysis of trust thus reveals that risk is necessary to establishing trust. People cannot be vulnerable without risk, so they cannot build trust. This conclusion challenges the assertion that blockchain is a currency of trust. Indeed, blockchain technology reduces risk to virtually zero. By using blockchain, organizations create and signal a work setting that is basically risk-free. Using blockchain as a serious management tool, which, according to the Deloitte survey, many executives hope to do, may therefore not be a viable possibility. But only with a clear understanding of how blockchain works can we fully analyze its potential utility in building trust.

Trust and the Function of Blockchain

Blockchain is a distributed database composed of a chain of blocks. Each block is a set of data linked to the previous block. Blockchain thus records chronologically the actions of everyone in an interconnected network. The result is a platform that maintains a transparent and immutable record of all events within a shared network. By recording each user's particular data (decisions, actions, etc.) in a transparent manner, it creates a system in which each participant controls their own data in the context of existing social networks and big data.

Blockchain uses consensus and cryptography algorithms to build a safe and secure environment in which participants agree collectively to interact, peer to peer. It likewise updates its data continually and collectively, rather than at the word of a single central authority, so that it can be decentralized. The blockchain protocol uses strict criteria to validate any update made, adding updates to the chain only after participants reach consensus. The system's security services use cryptography to make the data blocks tamperproof. Once a new data block is added to blockchain, cryptographic hash functions, such as SHA (Secure Hash Algorithm)-256, assign it a hash value, a unique string of identifying characters. Cryptographic hash functions include collision resistance, ensuring that any change to the block, however minute, will result in a completely different hash value.[16]

Each block also contains the hash of the previous block, confirming the data integrity of the chain up until that point. If anyone attempts to modify the established blocks, their efforts will be immediately detected and stopped. Indeed, it is not that blockchain focuses on tracking misbehavers, but rather that it *discards* any attempts to change blocks. Moreover, the fact that everyone immediately knows if someone tried to cheat should strongly discourage such

behaviour. Blockchain systems, then, use the principle of collective self-interest to ensure safe interactions.

The key quality of blockchain is thus that it creates a risk-free environment in networks of interaction.

The key quality of blockchain is thus that it creates a *risk-free* environment in networks of interaction. This quality is obviously important in light of the current focus on using technology to manage and promote trust. Indeed, if the network accounts for the past actions of every individual involved, minimizing the temptation to cheat, it creates a context in which the risk of being exploited by others is virtually zero.

And yet our theoretical analysis revealed that trust can only be built under a certain level of risk. How, then, can blockchain be a currency of trust? First, we must emphasize that we are not claiming that blockchain technology creates trust. Instead, trust is one result of the *system* that using blockchain technology creates.

By using a monitoring and control system like blockchain, organizations unequivocally signal that they do not trust their employees.

When used for management, blockchain's primary function is to coordinate and record actions so that network participants are assured of safe interactions. Because of this assurance, blockchain is likely to fail in building trust among an organization's workers. Indeed, research has shown that by using a monitoring and control system like blockchain, organizations unequivocally signal that they do not trust their employees to use company resources and information.[17] In fact, the more people's actions and decisions are scrutinized, the more likely they are to view the system as one that emphasizes rigid control rather than trust. A control system which does not allow employees the decision to be vulnerable to each other necessarily undermines their ability to voluntarily build trust.

In hailing blockchain as the new currency of trust, people seem to assume that total control over interactions will lead to trust. However, by adopting a behavioural perspective, we have found that the opposite may in fact be true. By creating a work environment so controlling as to be risk-free, organizations may actually prevent trust from being built. Our analysis has allowed us to identify several consequences of such efforts to use blockchain technology to manage trust in organizations.

The Consequences of Using Blockchain to Manage Trust.

Many surveys and popular articles describe blockchain technology as having the potential to improve organizations in a wide variety of ways. Yet, the blockchain hype is already beginning to decline. As a sort of blockchain fatigue kicks in, the business world begins to realize that its expectations may be unrealistic when it comes to applying blockchain to a wide variety of business needs.[18] In exploring how these technologies may help organizational management to thrive in a digital business environment we, as management scholars, recognized the need for open minds. Yet faced with concerns about unrealistic expectations, we also had a particular responsibility to think critically about the implications of technology-based management on worker motivation. In applying this careful rigor to our research, we reached four conclusions regarding the use of blockchain in managing trust within organizations.

Blockchain makes interactions safe through control and verification, denying people the chance to build trust voluntarily.

1. Blockchain will not build trust between employees.

Building trust within organizations requires that people make themselves vulnerable to risk. Without the chance to choose vulnerability, they cannot develop trust. When applied to management, blockchain creates a risk-free record of interactions. In essence, blockchain makes interactions safe through control and verification, denying people the chance to build trust voluntarily. Blockchain technology would therefore lead to management that prevents the emergence of true interpersonal trust.

2. Blockchain does build trust in the system.

Blockchain may thwart internal efforts to build interpersonal trust, but the same qualities become merits in inspiring workers to trust the system itself. By using decentralized principles to

guarantee and verify safe interactions,[19] blockchain becomes a kind of middleman, regulating the safety of users' interactions in a given network.[20] In other words, it acts as a control mechanism, ensuring cooperation within the company. It is ironic that blockchain should take on the role of authoritative middleman, since blockchain itself does not rely on a central trusted authority.[21] However, as our analysis shows, by taking up this position and status blockchain can be applied to a wide range of management functions.

3. Blockchain must be perceived as legitimate to build trust in the system.

In order for blockchain technology to work as a central authority system, securing safety, it is necessary that employees perceive the system as legitimate. If employees do not view the system as an appropriate regulator, its power to make them feel safe in the hands of a technological middleman is vulnerable. In other words, the blockchain system needs to provide assurance not only that interactions within the organizations are safe, but also that it is, itself, a legitimate regulator.

Any controlling authority is more likely to be accepted if it is perceived as procedurally fair.[22] Employees will judge procedural fairness by determining whether the methods the authority uses to make decisions are fair. Research has shown that people judge procedural fairness by whether those procedures give them a voice and are neutral, unbiased, ethical, transparent, accurate, and consistent.[23] Because blockchain handles information about those present in the social network, users must be assured, for example, of data accuracy, consistency of data collection, absence of biased principles, use of clear ethical guidelines, and the means by which those who are part of the social network can speak up and be heard.

4. Blockchain can build trust between organizations

Although blockchain does not create interpersonal trust *within* an organization, we conclude that it can be useful in building trust *between* organizations. Organizations have different qualities from people and the boundaries of inter-organizational trust, within which trust is built, function in different ways from those of interpersonal trust.[24] Interactions between organizations tend to be shaped in cognitive rather than emotional ways, running through data flows. The transparency and reliability of these data therefore play an important role in building trust between organizations.

Since all participating nodes (i.e. organizations) in the network have the same copy of the entire blockchain, all data are added with the knowledge and approval of all the organizations and according to agreed criteria, with none having greater authority than the others. And blockchain's cryptographic technology makes its data tamperproof, with any minor change being easily detectable so that it guarantees an immutable record of the information flow. All these unique features, then, make blockchain ideal for fostering trust between organizations by guaranteeing transparency and equilibrium.

Conclusion

In our conceptual piece we provided an analysis of interpersonal trust, which has a focus on being willing to be vulnerable to the actions of others, and used this perspective to interpret the relationship that blockchain has with the notion of trust. We conclude that blockchain is a system that in the organizational context will alter the nature of trust by changing the trust that exists between employees into trust that is given to technology. ■

Author Bios

David De Cremer is a Provost Chair and Professor at NUS Business School and founding director of the Centre on AI Technology for Humankind. GlobalGurus named him a World Top 30 Management guru and Thinkers50 identified him as a future management thought leader. Ranked among the world's top two percent of scientists, he has authored over 300 academic pieces, his most recent book being, *"Leadership by Algorithm: Who Leads and Who Follows in the AI Era?"*

Yan Pang is an Associate Professor at the National University of Singapore's Business School and codirector of its Business Analytics Center. His research focuses on big data analytics, blockchain, business analytics (BA) architecture, modelling methodology, and algorithm development. He formerly worked in Analytics and Optimization at IBM, leading technical solution design for the ASEAN Public Sector. Previously, he was Senior Manager and Lead Architect at IBM's R&D Labs and a research scientist at Motorola Labs.

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