The Potential Use of Blockchain Technology in Co-creation Ecosystems

Galina Kondrateva, Elodie de Boissieu, Chantal Ammi, Eric Seulliet

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ABSTRACT
Research literature on blockchain technology is starting to emerge. Blockchain technology is primarily associated with cryptocurrencies, raising interest in an application in other business sectors, thanks to its characteristics. The decentralized nature of blockchain creates the new concept of a token economy, which can help to trace and valorize intellectual property - one of the essential challenges in co-creation. This paper considers how blockchain technology and tokenization can solve challenges in co-creation projects consisting of large companies, startups and entrepreneurial accelerators. The paper proposes an exploratory analysis based on interviews conducted with French companies and startups. The findings include a framework of (1) challenges, lack of operating rules, trust, and traceability, and (2) the potential benefits of blockchain and tokenization to solve issues that...
The use of co-creation is increasingly recognized in innovation (Laperche, Burger-Helmchen, 2019). Co-creation enables optimization at all stages of the innovation process (Schmidt-Tiedemann, 1982; Sheth, 2019). Co-creation allows for the generation of more ideas at the ideation stage and, above all, produces a diversity of creative ideas from a plurality of actors (Sjödin, 2019). When it comes to experimenting with creative leads, a multiplicity of actors enables faster iterations, generating more relevant results (Sjödin et al., 2017). During the phase of developing viable and desirable solutions, co-creation makes it possible to build a constructive climate thanks to mobilization of the collective intelligence of the players (Hsieh, Hsieh, 2015; Reypens et al., 2016). The role of actors in co-creation will depend on their role in the ecosystem. Innovation clusters are one of the most effective ways to develop a co-creation ecosystem (Calamel, Chabault, 2020), as collaboration requires each actor to give and receive; in other words, it involves the mutual process of resource exploitation (Gay, Szostak, 2020).

However, co-creation processes face several limitations. There are quantitative limits because it is often materially challenging to bring together a large number of contributors. The scope of the innovations developed may also be limited, since contributors are generally recruited from a restricted and often endogenous circle of users. Emotional difficulties with envy, jealousy, and competition between individuals tend to lead to a natural tendency to overvalue individuals’ contributions and to minimize the contributions of others. Intellectual property identification, such as current legal solutions (patents, NDA, etc.), are not good tools in this instance. When it comes to co-creation, contributors are often deprived of the opportunity to value their contributions and receive personal recognition, a key stimulating factor in co-creation initiatives, as explained by the concept of “nudge” (Thaler, Sunstein, 2009). Finally, there are organizational and logistical difficulties in optimizing co-creation, in prioritizing and assessing the results.

Blockchain can be used as a means of overcoming these limitations and in order to scale up (Zheng et al., 2018). By allowing for the recognition of contributors, who can be paid with digital tokens (Ross, Jensen, 2019; Chen, 2018), blockchain produces a “nudge” effect (Çepni, 2019) thanks to the climate of trust it creates (Werbach, 2018). Due to the traceability and
capitalization of the contributions, blockchain also enables promotion of their recombination and provides coalescence between the contributions. Finally, blockchain affords stimulating new approaches in the intellectual property field and brings out new types of organizations based on sharing (Gummesson et al., 2010). Because of these benefits, blockchain could be a great lever to stimulate co-creation. Thus, this paper aims to identify the critical issues of co-creation and makes a number of suggestions for the way in which blockchain and tokenization can solve some of these issues.

Our paper is organized as follows. The introduction presents the context for our study, followed by a discussion of the theoretical background of co-creation, blockchain, and tokenization. Next, the methodology used is explained, in which a qualitative approach was selected, with interviews carried out in France to meet the objectives of this paper. Six managers of large companies in France who are running co-creation projects and seven founders or CEOs of startups were interviewed to gather diverse points of view on the topic of co-creation. Three experts in blockchain technology verified the results. Finally, our results are presented, and our propositions are discussed, followed by a conclusion, limitations, and potential future research.

Theoretical Background

Co-creation and Intellectual Property Issues

Collaboration modes concern forms, patterns, or conditions that describe and justify collaborative activity structures and control interactions among collaboration units (To, 2016). Researchers distinguish the formal mode of collaboration, which can regulate and ensure adequate exchange and contributions among interacting work units, from the informal mode, based on immediate and spontaneous interaction, with a mutual responsiveness at all phases of collaboration (Hoang, Rothaermel, 2005).

According to Grönroos (2012), co-creation is an activity of collaboration with the purpose of creating value for one or both participants of an ecosystem. Thus, ecosystem actors should share their knowledge and resources to really contribute to co-creation (Sjödin, 2019). Actors are involved in a huge pattern of network relations in which their interactions occur (Ramaswamy, Ozcan, 2018). Today, startups are a major source of innovation for creating products or services and for reinventing new business models, which form a conceptual link between strategy, business organization, and systems to create, deliver, and capture value (Lima, Baudier, 2017). Foresight and innovation are closely related (Gattringer, Wiener, 2020). Companies that embrace
an open innovation or co-creation strategy increasingly look to startups as a source of external innovation. Open or co-innovation is a new paradigm that assumes firms use external and internal ideas and paths to market (Chesbrough, 2003; Calamel, Chabault, 2020) to create businesses (Mocker et al., 2015). To facilitate these new collaborations, corporations have created “corporate accelerators” to nurture innovations and add value for startups to produce innovation benefits for the company (Kohler, 2016). This new relationship is a challenge for both parties, in that it must allow startups to find the financial, managerial, and technical help they need while allowing both contributors to benefit.

According to some research, the consequence of open innovation and co-creation could be the abandonment of the legal protection provided by all the patents and innovations developed by a company (Chesbrough, Appleyard, 2007). However, some academics do not agree with this fact and consider that, on the contrary, intellectual property rights (IPR), and patents specifically, play an important role in open innovation as they permit the disclosure and safeguarding of information (Pénin et al., 2011; Pénin, Neicu, 2018), an affirmation that is confirmed by different experimental results (Zobel et al., 2016). To be patentable, an invention must (1) be new, (2) involve an inventive step, and (3) be capable of industrial application (Rivière, 2018). Most companies develop technologies to improve their competitiveness (Banerjee, 2014) as well as to protect their intellectual property (Park et al., 2015). Patents are the most attractive protection mechanism (Candelin-Palmqvist et al., 2012), in comparison with copyrights (Bos et al., 2015).

Two types of blockchain consortia can be distinguished: 1) the business-oriented, where the purpose of members, usually composed of same sized firms, is to solve one or more business problems 2) the technology-oriented, composed of different sized firms, with the purpose to develop platforms used by different types of businesses (Gratzke et al., 2017).

Blockchain solutions stimulate collaboration with the promise to acquire better business benefits and the opportunity to ameliorate competitive advantages but involve mutual trust, transparency, and efficiency (Zavolokina et al., 2020).

According to Henkel (2006), a firm can open up its technology publicly for external collaboration but there is no guarantee that they will succeed. Open innovation could be considered as uncertain and risky for two major reasons: a lack of coordination and trust among groups of actors (Bollier, 2015), and the tarnishing of the optimistic vision of mutually beneficial cooperation. The implementation of a blockchain technology based on transparent decision-making procedures and decentralized incentives systems could be a
solution for improving collaboration and cooperation (Bollier, 2015). Indeed, blockchain not only allows for currency transactions, but it can also register assets, in this case known as “smart assets” (Walport, 2016), which are uniquely identifiable, linked to the owner, and traceable inside the patent system, allowing for the recognition of each contribution and the traceability of ideas and inventions through smart contracts (Seulliet, 2016).

**Blockchain and Tokenization are the Future of Co-Creation**

First proposed by Satoshi Nakamoto with the creation of the bitcoin (Nakamoto, 2008), blockchain is a distributed network and chain of cryptographic blocks combined together to form a peer-to-peer (P2P) decentralized network (Puthal et al., 2018; Gatteschi et al., 2018), having two types of nodes that communicate with each other in a P2P manner. The purpose of blockchain is to guarantee that the system is open to all parties: a transaction is verified before it is added to the ledger, and in this way, the system ensures that only valid transactions are allowed (Drescher, 2017). The merits of blockchain (Lu, 2019) are based on the principles of: (1) decentralization – the peer-to-peer blocks are able to record and store all transactions without any third-party intervention; (2) distrust – participants do not need to manage mutual trust relationships in the blockchain system, which leads to an increase in transactions (trust in the technological aspects is more important than trust between the participants); (3) transparency – arises due to the sharing of records and querying of data in nodes in a decentralized structure; (4) traceability and unforgettability – created by the use of timestamps to identify and to record each transaction, making the data traceable and reinforcing irreversible modifications to data or information; (5) data encryption in the blockchain guarantees the security of transaction data and reduces the risk of losing or falsifying transaction data due to a certain level of anonymity; and, finally, (6) credibility – the blockchain network protects the privacy of all of the parties involved and increases the security and credibility of the transaction.

Initially developed from bitcoin cryptocurrency, the technology of blockchain proved its value in FinTech, with deep research pathways showing their effects in stock markets (Ji et al., 2020), and in the sensitive area of financial services in banks, as knowledge-hiding can be resolved with blockchain technology and can extend knowledge-sharing (Chang et al., 2020). Progressively, other domains have recognized blockchain as being essential for improving existing systems and developing new ones. The digitalization of medical data caused the emergence of alternative storage practices,
including clouds, and blockchain technology use increased the security of medical records (Kaur et al., 2018). The Internet of Things, government by e-government and e-voting, intelligent transportation systems, smart contracts in the commercial world, industries and supply chain (Mohanta et al., 2019; Baudier et al., 2021) are some of the promising benefits of this disruptive technology as a solution for critical issues. The use of blockchain has the particularity to allow for the protection and promotion of intangible assets. Traceability and disintermediation have consequences for optimizing the value created, acknowledging everyone’s contributions, and providing a fair attribution (digital token or social recognition) to the authors, a fundamental characteristic of the token economy (Park et al., 2020).

A “token” is the digital representation of an asset, a sort of security document, available on the blockchain (Weingärtner, 2019). The token is not necessarily related to a cryptocurrency like Bitcoin or Ether, but refers more to a smart contract on a blockchain (Massey et al., 2017). The well-known platform Ethereum, based on decentralized applications (Wood, 2014) and used to create any arbitrary smart contract, includes digital tokens (Lipusch et al., 2019), as well as ICO (Initial Coin Offering), considered to be a good means of vitalizing a blockchain ecosystem (Catalini, Gans, 2018). Tokens can be used for a variety of purposes, such as paying for access to a network (e.g. Netflix, Airbnb), tracking the status of parcels, or the implementation of a digital platform, using currencies, securities, properties, or loyalty points (Buterin, 2014).

Building a tokenizer (Mazzei et al., 2020) requires, on the one hand, a dedicated hardware solution capable of reducing the scalability of the systems, composed of specific devices with digital interfaces for connection purposes and digital controllers for the machine, and, on the other hand, a Software Development Kit (SDK). The Hayes command set includes various controls for setting up the modem, including a set of register commands, which allows the user to directly set the various memory locations in the original Hayes modem. The smart contract becomes, at this stage, an asset, in this case called a token, containing a digitalized story of the different exchanges.

The development of blockchain technology and tokens could give entrepreneurs and innovators new ways to raise funds to finance their growth and compensate their core developers (Lerner, Tirole, 2002). With blockchain technology, projects can raise funds not by asking for donations but by issuing digital tokens. Some tokens could sometimes be used as ownership stakes in profit-sharing crowdfunding campaigns and, in other cases, as preorders in preordering crowdfunding campaigns (Belleflamme et al., 2014).
The pervasive nature of blockchain, as the first native digital medium for value (Tapscott, Tapscott, 2016), permits a form of distributed social governance with an incentivization system implemented on the blockchain. The example of the Backfeed model, where the roles and tasks in the community are not predefined, but more defined in an open and meritocratic model, where everyone is rewarded according to their influence in the community, is very illustrative of these new relations. Backfeed protocols enable people to coordinate themselves through a decentralized governance model that distributes token rewards and reputation benefits to all. The Backfeed business model is based on a sort of operating licence sold to a company, which the latter can adapt according to its needs. Founded on a decentralized approach and a new consensus protocol known as “Proof-of-Value” (PoV), it allows for the evaluation of the perceived value of each contribution. A contribution can consist of any action with potential value, tangible or intangible, as a code, a design, an idea, or a service, as evaluated by all the partners involved in the process of co-creation. The weight of each contribution can be rewarded by a variable reputation score, according to the level of influence in the collaborative project or, in some cases, by financial compensation in the form of digital tokens (Pazaitis et al., 2017). These tokens, which are transferable and exchangeable in most currencies, represent a measurable unit of value and provide incentives for users to commit resources to the network and, thus, secure transactions without the need for a trusted intermediary (Van Valkenburgh et al., 2014). They can be used as reward items, means of exchanges, and even as a means of payment. The development of this model, based on the characteristics of scalability, security, openness, trust, and cost (Li et al., 2017), could bring about the emergence of a new ecosystem composed of a multitude of co-creation projects. Thanks to the key properties of integrity, resilience, and transparency of blockchain technology, the co-creation process, with the integration of these tokens, could become an attractive option to companies for implementing flexible business processes, promoting collaboration and collective decision-making (Viriyasitavat, Hoonsopon, 2019).

**Methodology**

**Grounded Theory Approach**

Using an exploratory approach, we analyzed interactions between startups and large companies involved in co-creation projects and blockchain implementation by conducting a qualitative study. Grounded Theory was selected...
for this study because it is often recommended to analyze complicated (Gammelgaard, Flint, 2012) and new topics (Strauss, Corbin, 1998). In our case, the paper is related to the comprehension of co-creation projects, which involves understanding of the content, the determining factors and outcomes of such phenomenon. In this domain, Grounded Theory enables us to collect respondent perspectives in order to propose a framework for co-creation projects. Thanks to this method, the paper proposes new and emergent themes related to new technology (blockchain) solution implementation (tokenization) in the co-creation field.

Two researchers analyzed the interview transcripts using manual coding following the Grounded Theory (GT) approach. Of the three ways of coding (open, axial, and selective coding) for GT, researchers chose to use open coding, which refers to “the process of breaking down, examining, comparing, conceptualizing, and categorizing data” (Strauss, Corbin, 1990, p. 61). By

<table>
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<tr>
<th>No</th>
<th>Interview transcripts’ parts</th>
<th>In vivo codes</th>
<th>Sub-categories</th>
<th>Higher categories</th>
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<tr>
<td>2</td>
<td>“When we get a portfolio so large, the subject is very complicated, to be able to filter is a real issue; therefore we have to understand the value proposal or the intention that it is worth it to deploy the follow-up.”</td>
<td>To understand the value proposal</td>
<td>Convergence of interests</td>
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<td>2</td>
<td>“Startups have real interest to work with us because they look for mentors in order to gain a broader view on their innovation and then relationships can be closer.”</td>
<td>To gain mentors</td>
<td>Trust among participants/Convergence of interests</td>
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<td>5</td>
<td>“When it fits well with the large group, it means there is a match: when the innovation proposal answers a problem perfectly, it means the level of prototyping of the startup is already well advanced.”</td>
<td>To match to actor’s needs</td>
<td>Convergence of interests</td>
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<td>6</td>
<td>“It (co-creation) starts with an actor in the company, we will adjust the sourcing and curate the call for the project, but in reality, it’s better that we seek the corresponding startup by ourselves.”</td>
<td>To match the actor’s needs</td>
<td>Convergence of interests</td>
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consistently comparing the data being analyzed, researchers related parts of the interview transcripts to concepts, which were collected and used to produce labels (sub-categories), and then grouped into higher categories as shown in Table 1. Using an abductive approach, researchers only consulted the literature on co-creation and blockchain (BC) once a major category had emerged (bottom-up coding), helping them to define the category’s potential properties and dimensions. The process involved a constant back and forth between analysis of the data and a reading of the literature, but with data coming first. An initial list of codes evolved as more interviews were coded.

**Research protocol and trustworthiness**

To follow the GT approach, the roadmap that was used for our sampling and data collection phase is included in the use of memos and theoretical sampling, the constant comparison of data and concepts, the saturation of data and concepts, and the process of abstraction (Strauss, Corbin 1990, 1998), as it is featured in Figure 1.

![Figure 1 - Research protocol](image-url)

**Figure 1 – Research protocol**

1. Memos and transcripts
2. Theoretical sampling
3. Constant comparison between additional data and categories
4. Coding with an abductive approach
5. Explanation of the phenomenon of co-creation projects
6. Emergent themes: BC solutions in co-creation field
Because GT enables the development of a general explanation, model, or theory, shaped by the views of participants who are familiar with the phenomenon (Strauss, Corbin, 1990, 1998), we had to assure ourselves that our data collection was covering all the various participants involved in the co-creation ecosystem and BC implementation. Therefore, we started by doing exploratory interviews with the two co-founders of a French blockchain-based co-innovation platform company (ValYooTrust). This step helped us to understand better the variety of stakeholders working in the field and enabled the triangulation of our data, thanks to interviewing thirteen various informants such as six different initiators, three respondents (start-ups), and four accelerators or enablers (agencies) of co-creation projects in several sectors (Table 2). Moreover, we were able to guarantee the credibility of our findings thanks to peer debriefing. Hence, the two researchers coded the interviewees’ transcripts to ensure greater reliability and then the results of each respondent were analyzed and compared with the others. Researchers also paid attention to the use of a “thick description” for the definition of each category in order to evaluate the applicability of their observations to other contexts, thanks to the mobilization of one external researcher. The latter person was also asked to check the process through which the study was conducted to ensure the dependability of the findings. Finally, to guarantee the trustworthiness of our findings, we showed our results to three external experts working in the blockchain economy at the EY Consulting Group.

**Data Collection**

The interview guideline was semi-structured to allow interviewees more freedom in their answers and allowed them to introduce other issues. The guideline was organized around three different themes in order to understand how this technology could be used to solve challenges in co-creation: (1) the general context of co-creation in their company (frequency, motivations for launching or responding to co-creation, advantages of co-creation in comparison with internal innovation, operating rules); (2) their recent experiences of co-creation (purpose, milestones of collaboration, human, time, and financial resources, constraints and limits, reasons for success or failure); (3) the impact of BC on their co-creation practices (perceived advantages, potential observed constraints).

First, immediately after each interview, the researcher took extensive notes in order to record the main highlights and the interviewee’s thoughts (“memos”) following the GT approach. Second, the researcher transcribed each of the recorded interviews manually. Then he decided to stop collecting
data when theoretical saturation was reached. In our research, this was obtained on the seventh interview.

**Sample Presentation**

We mobilized the ValYooTrust network and completed this with our own professional network until theoretical saturation was obtained following the GT protocol. We arranged interviews with five large French corporations, which were selected because they covered a wide range of business sectors (telecommunications, automotive, aeronautics, luxury, postal sector) with different statuses (monopoly, public companies, and privately-owned companies) which represented different contexts of co-creation as well as different stages of the co-creation process (from the ideation stage to the deployment stage). In addition, all the companies chosen had an innovation department with strategic importance for the company thanks to its hierarchical position in the structure (directly linked to the CEO and company decision-makers). Finally, all the companies had conducted a large number of co-creation projects in the last five years and started to pay attention to the benefits provided by blockchain technology, which guaranteed the respondents’ knowledge and the representativity of their insights. Moreover, we interviewed the founders and CEOs of startups and entrepreneurship accelerators to gather diverse points of view on co-creation and gain insights from the other side of co-creation collaborations. All the respondents were in direct contact with

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<th>Table 2 – Data collection</th>
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<td>Interviews - Initiators of co-creation projects</td>
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<td>Interviews - Enablers of co-creation projects</td>
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the co-creation process: as initiators for the large companies, as respondents to a call for co-creation for startups, and as enablers for agencies. In addition, the interviewees had all run co-creation projects on a national, European, or international level, which allowed us to better understand the co-creation economy on a large scale. The characteristics of the respondents are featured in Table 3. Among the respondents, three were CEOs of startups, six had major responsibilities in the innovation departments of large companies, and four were founders and CEOs of enabler agencies. The interviewees had an average of 11 years of professional experience in R&D teams and had conducted co-creation projects in different geographical and sectorial contexts. For confidentiality reasons, personal information has been removed.

Results

The interviewees raised the challenges in co-creation projects related to: (1) operating rules; (2) trust between participants; (3) transparency and traceability of each contribution. The participants subsequently discussed these challenges with the benefits of the potential or ongoing implementation of blockchain technology. The results are visualized in the form of a framework (Figure 2).

Figure 2 – Framework of potential benefits to eliminating the challenges of co-creation by implementing blockchain

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<tr>
<th>CHALLENGES OF CO-CREATION</th>
<th>BENEFITS OF BLOCKCHAIN SOLUTIONS</th>
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<tr>
<td>Operating rules</td>
<td>Decentralization: Proof-of-Value (PoV)</td>
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<tr>
<td>Trust: credibility, ethics, reciprocity</td>
<td>Distrust and transparency, credibility</td>
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<tr>
<td>Traceability: privacy and intellectual property rights</td>
<td>Traceability, data encryption</td>
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Operating Rules in Co-creation

The first challenge for startup-large group relationships in the co-creation is basic agreement on operating rules. All participants involved in co-creation processes admit that, at the beginning of the relationship between startup and company, operating rules must be finely-tuned in terms of framework and objectives, time-to-market, human resources, and motivation and involvement of stakeholders (on both sides) in relation to the project: “We reached agreement via a contractual framework containing a working time, a budget, the logistical framework.” (6) This agreement needs to accurately define the scope of the co-creation process, which often necessitates a trusted third party (enabler). One of the solutions for an enabler could be a blockchain: “The main difficulty is the horizontal operation; the blockchain is just an enabler to make people collaborate more with each other...” (7).

Framework, Objectives, and Time-to-Market

Startups are often invited by corporations to share their ideas or concepts, but they often regret doing so, as corporations frequently have no idea of the project they intend to launch with them. At this stage, the large company has not yet designed a framework and the startup releases its ideas to their employees.

“We bring the architecture of the project so that it fits into external funding; it's not driven by the direction and the need to work together.” (1)

When it comes to business flow, a startup is viewed like any other supplier of a large group and has to follow the same process in terms of corporate accreditation. The startup has to obtain the approval of financial, legal, and commercial departments in order to be officially listed by the large group. Most of the time, these are obstacles that slow down the collaboration process: “Cumbersome bureaucrats, buyers, everyone …. not to mention the community complexity that exists, and which makes me think of the adage ‘the United States innovate, the Chinese produce, the European Union regulates, the French tax’. (4)

In Europe, the legislation is not that clear and startups feel that they are not well protected, even though they still have to share and promote their ideas to get contracts. For this reason, the only situation where startups are able to limit the risk to their intellectual property occurs when the startup is “mature enough” (5, 6 and 12). In this situation, the project will already have been prototyped and the large group is just an enabler, allowing the project to scale in a larger field.
Another constraint of the framework in co-creation in such a relationship is pressure of time. Most respondents stated that the time schedule should be precisely defined. The time-to-market of the co-creation process was four months on average (from prototype to market entry): “We often observe a lack of reactivity on the part of the large group; when it is too long, this causes the project to run out of steam and we never launch.” (3)

Even the use of the potential benefits of blockchain technology is not clear without the basic framework of the relationship in co-creation. “It would be great to have co-signed contracts via the blockchain or not, but today it is impossible because the startups would first have to equip themselves to have this type of contract and know how to protect themselves legally…” (6)

**Resources and motivation**

Besides a framework, interviewees highlighted a lack of resources from support functions of large groups for co-creation projects, and this can be a challenge when an innovation relates to something that is not at the top of priorities. When there are no dedicated resources from support functions within a large group and no one is assigned to the co-creation process to respond to startups’ requests and to push the project forward, startups can get lost and be close to failure:

“We have our roadmap projects in addition to bespoke innovation projects which can take up the time of people who have no time; on specific issues, for example, we only have two experts (who can help).” (2)

Both parties also revealed the importance of human motivation, especially on the project leader’s side, in the process of co-creation. This individual has to be convinced of the value of the project for their company, because they will have to convince other colleagues who are impacted by the project: “It depends on the director of innovation, if he wants to create links, human contacts, it works; otherwise it doesn’t work. It’s much related to the people we meet.” (10). Moreover, the person who sponsors the project has to be endorsed by the large group’s decision-maker or CEO (2, 7, 11, 12), otherwise he or she is does not have credibility with internal potential innovation users. Finally, human motivation remains a key element for the success of a co-creation project: “Blockchain cannot do (be implemented) without interactions. From my point of view, there is a human dimension, we are not necessarily in rational relations, there is still a whole dimension of creating a relation, we need the actors who create that…” (9)


**Involvement of Stakeholders**

Project leaders from corporations also point out that they were not considered as a priority by any of the business unit managers; they were viewed as time wasters, or sometimes even as “entertainers”: “…But you have to stop doing cool things, rather than doing things that have a business impact, but it’s old school, you have to work together, share together, it’s a real corporate culture.” (11) According to interviewees, the large group decision-making process is often not clear in the case of a co-creation development with startups. People do not like taking risks. Even though they are the final decision-makers on a specific topic, they prefer to stay in the background and delegate responsibility to an expert who will have no particular stake in the project: “The person who will make the decision will not necessarily be the one in the hierarchical line, it may be a transverse director, who has no stake (in the corresponding project).” (4)

In the first challenge of the operating rules, two principal issues are involved: defining formalities and maintaining the relationships. The implementation of the blockchain only resolves the issue of formal regulations, signing contracts, creating a traceable approach in relations. Nevertheless, human relations remain important to start and succeed in co-creation, and are not replaceable by the technology, “…but it is a tool. We cannot substitute this type of trusted third party role with a blockchain-type device…” (9)

**Trust between Participants**

The second challenge relies on a lack of trust between participants. It explains why startups limit their participation in co-creation projects with large groups, while companies also hesitate to engage with startups. Trust involves several parts here. First, the large company doubts the credibility of the startup and its team, because they lack guarantees of its skills or its capacity to deliver on time:

“As soon as we started to get down to specificities in our deliverable request... there were bugs, the startup was not always ready, and things weren't done on time… We had the impression that it was more a problem of workload and a lack of rigor on the side of the startup.” (9)

On the other hand, a lack of trust between participants can be related to a divergence of ethics. Large groups are wary of being used purely for their “logo” on startups’ websites, providing them with more credibility in a certain field, and enabling them to raise money for further investments: “…for the startup, this can be beneficial when it is looking for funds” (4). Meanwhile, startups are cautious about sharing their ideas or concepts with large groups because of intellectual property risks: large groups may exploit their ideas
using their own internal development teams: “We made ourselves known but they are happy because they have received our ideas.” (5)

The solution of the trust challenge is in convergence of interests or reciprocity. Interviewees agreed that the co-creation process works well when both parties have common interests. To achieve reciprocity an enabler might be needed. It can identify a startup that is looking for a large company to develop its prototype and a group that is searching for a well-advanced prototype responding to a specific business unit’s need. Where there is reciprocity, participants have complete trust in the success of the co-creation process: “It is clear, if startups do not apply, it’s because of a lot of disappointment on both sides. One side is not more to blame than the other; there is a misunderstanding in the relationship between the two parties: the expectations of some are not always synchronized with the needs of others.” (6)

The reason for trust being a challenge is a consequence of the lack of formalities that are missing in the first stage, which was discussed by respondents before. The implementation of blockchain could decrease the effect of the mistrust, although it cannot change the established relationships, “I was working on blockchain topics beforehand and I was in contact with startups, when I saw that they had initiated a blockchain project around this which was in a beta state, I found that the idea was rather attractive for a live application.” (7)

**Transparency**

Finally, the challenge of transparency is the important constraint in co-creation because it leads to the issue of intellectual property rights. The lack of ease in large companies and the difficulties to trace the ideas generated by the startup in the co-creation process impede transparency.

“… our ideas [those of the startup] have been shared (with the large group)… we sign up to confidentiality agreements as if they [the large group] were imposing them on us, we don’t have a chance to read them, we sign them mechanically.” (5)

One of the issues that appeared due to a lack of traceability is misuse of intellectual property. On the one hand, it can be a problem of internal communication when business units in large companies could be working on the same type of project without anyone being aware of existing co-creation projects. On the other hand, the lack of intellectual rights protection produces misunderstandings, and possible conflicts between the large company and a startup.

When it comes to the traceability of intellectual property, we found that large groups had no clue about how to quantify the contribution of the copyright of a startup’s idea in the co-creation process, “This is done in a very
qualitative and not a quantitative way... there is a contribution of 10% in the IP—
in the shared case it is 50%—if there is a dispute, it goes up to 20%. As it is difficult
to quantify, this has never been a problem for me, we find a compromise.” (12)

Blockchain solutions are mostly important to implement to resolve the
misuse of intellectual property rights, to establish traceability and, as a con-
sequence, trustworthiness.

“…to have secure contract exchanges, traceability of exchanges, each time we
want to be able to document… there is a curiosity associated with the blockchain
on an internal scale, we are choosing, we are evaluating…” (1)

Our results raised the challenges of a co-creation process that can be
solved by implementing blockchain and tokenization; these benefits can
facilitate collaborations between startups and large groups in co-creation
(Figure 2).

**Discussion**

This paper aims to uncover the potential of blockchain technology to
improve the process of co-creation by examining the challenges faced by
large companies and startups. The paper proposes the framework (Figure 2)
and develops three main propositions.

**Proposition 1: A co-creation ecosystem can work
very well by optimizing the collaboration process**

By design, co-creation incorporates interactions, “agencing engagement”,
environments, and organizations (Ramaswamy, Ozcan, 2018, p. 200). When the process of co-creation involves external actors to an organiza-
tion, it becomes complex. All interviewees agreed on the essential require-
ment of establishing operating rules, and this corresponds to the points
of view expressed in previous studies. Thus, Kohler (2016) proposes four
dimensions (proposition, process, people, and place) to describe operating
rules facilitating interactions between corporations and startups. Our results
have shown the importance of framework and objectives, which define this
new organizational relationship. At the start of a collaborative project, tan-
gible outcomes and individual benefits should be recognizable for the par-
ticipants (Gattringer, Wiener, 2020). The interviewees raised the issue of
“time-to-market” market entry; startups should demonstrate that they are
both agile and have the capabilities associated with the latest technological
trends, as well as having the potential to accelerate the pursuit of new market
opportunities (Kohler, 2016). Finally, human motivation is important on both sides, but the interviewees highlighted the imperative role of personality at the top of a company’s hierarchy, and the need to obtain the commitment of senior executives. CEO involvement is a key element of the co-creation experience (Kohler, 2016; Gattringer, Wiener, 2020). In collaboration projects, individuals depend a great deal on the actions of other individuals and the actions of their management (To, 2016). The lack of operating rules arises from weak legislation, according to our interviewees, as confirmed by other researchers (Savelyev, 2018; Gürkaynak et al., 2018).

**Proposition 2: Blockchain can secure co-creation between startups and large corporations**

The issue of intellectual property rights in the co-creation process has attracted the attention of a number of researchers. Blockchain technology has been implemented or tried in many contexts, for example, in a “blockchain hackathon” by the EUIPO (European Union Intellectual Property Office) used to discover how blockchain technology might be used by enforcement authorities in anti-counterfeiting (Gürkaynak et al., 2018). Associated with the problem of intellectual property, interviewees pointed out the problems of transparency and traceability. In fact, they find it impossible to know at what exact moment co-creation started or whether the contribution of each side is somehow registered.

Many researchers see blockchain as a technology that will improve information security and transparency (Lee, 2019; Lu, 2019). If it is applied in the field of intellectual property, it can use encryption algorithms (Wang et al., 2019). As with intellectual property, rules in society are considered as contracts; through computer language, they can be recorded as smart contracts, and then carried out as unique operations in the blockchain, including digital tokens (Lipusch et al., 2019). Our large company interviewees admitted that they do not know how to quantify the contribution of each participant in co-creation projects. The use of asset tokens, which take the form of dividends that depend on the startup’s future profits, is a potential solution for this issue. In other words, tokens will be the equivalent of a kind of share, similar to the notion of stocks (Lee, 2019). A contribution made by a participant in co-creation that is regarded as a valuable action can be rewarded according to its level of influence in the collaborative project (Pazaitis et al., 2017). The tokens, which are transferable and can be exchanged for cash, are a measurable unit of value (Van Valkenburgh et al., 2014).
Proposition 3: Blockchain and tokenization solve the intellectual property issues of co-creation

Intellectual property, of course, is covered by legislation. However, the results of our research raised the issue of trust during collaborations in relation to aspects other than copyright. Interviewees refer to credibility, ethics, and reciprocity when speaking about trust in relationships, and this is consistent with previous research, because trust is the focus of many studies in numerous contexts. According to Dupont et al. (2019), trust is a key success factor in the development of organizations. Trust between the members of a company is also necessary to ensure balanced and profitable relationships (Dupont et al., 2019). Furthermore, ethical problems can arise on both sides. Co-creation can be an uncertain and risky situation, as interviewees noted and researchers have confirmed, for example, in the misuse of collaborative aspects, such as the corporation’s reputation or ownership of the ideas of the startup (Rivière, 2018). Nevertheless, relationships are built on convergent interests: if the level of reciprocity is relatively high, trust is not in doubt. One of the solutions for maintaining credibility and mutual understanding of the activities of each party is the involvement of a technological solution. Blockchain is known as “The Trust Machine” (Lee, 2019, p. 2; The Economist, 2015). Blockchain technology develops trust in the network by ensuring a verifiable transaction. The decentralized nature of the technology does not require any trust in a central authority (Ahluwalia et al., 2020). As previously discussed, tokenization can be used for intellectual property protection because of its role in verifying transactions, and ability to prove the fluidity of the innovation process. Using tokenization, cost reductions, trust, and decentralization can be applied to all business functions (Ahluwalia et al., 2020).

Our interviewees also raised the problem of the careful selection of participants (on both sides) to enhance trust, even though trust is not as great an issue as it is in other forms of collaboration where there is a lack of competition between participants (Gattringer, Wiener, 2020). Our paper discusses the application of blockchain technology to collaborations between startups and corporations. A new issue that researchers have raised is how to address trust in the nodes inside a blockchain (Viriyasitavat, Hoonsopon, 2019). This is not a problem in public blockchain, but in permissioned or private blockchain with limited nodes. In co-creation projects, both sides (groups and startups) could be anxious about using public blockchain for reasons of copyright or hacking. However, a closed system does not allow users to express their requirements regarding which nodes are authorized (Viriyasitavat, Hoonsopon, 2019).
Based on the interviews we conducted, we believe that important issues for the co-creation ecosystem could be addressed by the application of blockchain technology. The characteristics of the technology will facilitate efficient transactions, where trust and security are high. Blockchain technology can reduce transaction costs for stakeholders, increase innovative effects thanks to high levels of intellectual property protection, and evaluate the perceived value of each contribution in co-creation projects.

Conclusion

We have conducted a study on the potential of blockchain and tokenization for the co-creation process in the context of large groups’ collaborations with external startups. The purpose of our research is to understand the challenges and weaknesses in existing co-creation processes and to discuss the potential of blockchain to solve important issues. Based on interviewees’ feedback, the main problems surrounding co-creation in collaborative projects between large groups and external startups concern the lack of unerasable operating rules from the very beginning, the lack of trust, and the absence of transparency. All these aspects directly or indirectly affect the question of intellectual property, which is a key issue in co-creation.

The main challenge facing the widespread adoption of blockchains for the enforcement of intellectual property rights is the difficulty of explaining and understanding the complexities of the technology. Only a small number of our interviewees were familiar with the concept of blockchain, and tokenization in particular. Therefore, when compared to similar papers on blockchain, this study has managerial value and does not focus on the technical aspects of the technology, other than on the characteristics of blockchain that provide advantages for its implementation. Thus, even if the topic is regarded as complex for non-technicians, this paper is designed for a large potential audience, with interdisciplinary contributions.

Interviews with three intermediaries involved in the innovation process and using blockchain technology confirmed that the issues raised are consistent with the perceived benefits of use of the technology. Co-creation approaches based on blockchain have interesting implications for companies and management, allowing them (1) to resolve the thorny issue of intellectual property ownership of ideas generated and developed by employees, (2) to unlock co-creation initiative, (3) to develop collaborative innovation practices, (4) to encourage employee involvement (De La Rosa et al., 2017), and, finally, (5) to facilitate and expand their intangible capital (so that when, for example, an employee resigns or retires, his or her knowledge is not lost). The
Amelioration of commitment levels and the empowerment of employees in turn generates a climate of cooperation and collective intelligence with various benefits: transparency, goodwill within the company, and an incentive to better adhere to the company’s culture. This co-creation approach based on the use of blockchain is also interesting at the level of a company’s HR policy, enabling a precise identification of employees’ skills and aptitudes and their training needs. This overall incentive to generate a spirit of internal collaboration can obviously be transposed to external relations. A company that favors co-creation based on the blockchain will be more open and much more inclined to build external partnerships and alliances based on trust with various players—suppliers, customers, partners, distributors—and to develop communities of users generating virtuous spirals of customer loyalty, reputation, notoriety, and goodwill. Finally, a co-creation policy based on blockchain allows for many more horizontal and decentralized organizations, DAOs (decentralized autonomous organizations), and gives more autonomy to people, allowing decisions to be taken more quickly while freeing up initiative.

This study has, however, some limitations. First, the technology itself provides a limitation, because it is new and complex to understand. Most of the collaborators in companies and startups are familiar with blockchain in the context of cryptocurrencies, and do not see ways of implementing it elsewhere. Moreover, research on wider applications started not so long ago, and many studies are exploratory. Second, the interviews, even if they are very promising, do not represent the opinions of the majority and are limited by a lack of knowledge and use by participants of blockchain technology in general. Third, having a limited number of startup participators lessened the value of the study for the least protected part of the co-creation process.

Nevertheless, this exploratory study has opened up some questions and suggested paths for future research into blockchain implementation in the co-creation process. As there is a huge potential for, and many practices involved in, the implementation of blockchain in intellectual property rights, future research could focus on problems of legislation, both national and international, because of the boundaryless nature of technology: how can this problem be solved in case of the involvement of intellectual property rights in different countries, for example. The other potential research avenue is to go deeper into the co-creation process, even within small collaborative groups, both internal and external, to understand whether the participants might adopt blockchain technology. Finally, we see opportunities for this technology in many fields where only limited research has been done, such as anti-counterfeiting, and we share a positive outlook on the potential of this technology.
REFERENCES


