

# **BLOCKCHAIN PLATFORM ECOSYSTEM: AN EMPIRICAL ANALYSIS ON THE ITALIAN BANKING SECTOR**

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## **ABSTRACT**

Platform based business ecosystems are becoming increasingly relevant and continue to receive attention from scholars and practitioners. A key aspect that gained the interest of researchers is the role of the platform provider and how its dominant position can influence the ecosystem of actors involved in the platform. However, a new technology that emerged in the last years could change the role of the platform provider: blockchain. We explore how blockchain could allow firms to create platforms by making joint investments in shared infrastructure without assigning market power to a platform operator and if this can reconfigure the role of the platform provider. The paper is based on a single, exploratory case study through which we have analyzed the ABILabChain project, a blockchain platform promoted by the Italian banking association that is now live with the participation of almost the entire Italian banking system. Our work describes the process that brought to the creation of the blockchain platform, from prototypes to pilots and live deployment. We describe how the ABILabChain blockchain platform is created discussing the role of ABI Lab as a platform provider.

## INTRODUCTION

Real-world applications of blockchain are growing and what was once just a revolutionary way of exchanging money is increasingly considered a foundational technology (Iansiti and Lakhani, 2017). In the last years, consortia of companies started using blockchain to create platforms in which the technology provides a decentralized, immutable record of information that can also be used to develop decentralized applications. Still, despite the progressive adoption of blockchain, institutions struggle to have a clear understanding of its benefits (Weking et al., 2019; Klarin, 2020). Business ecosystems based on platform technologies are extensively studied in literature and have emerged in many industries as an increasingly relevant form of interfirm collaboration. Blockchain allows firms to create platforms by making joint investments in shared infrastructure without assigning market power to a platform operator, increasing competition, lowering barriers to entry, and lowering privacy risks. (Catalini and Gans, 2016). The absence of intermediaries and a single platform owner in blockchain ecosystems, however, can also introduce new types of inefficiencies and governance challenges. (Catalini and Gans, 2016; Schmeiss et al., 2019). Establishing decentralized governance in blockchain platforms is essential for their success but achieving the right level of collaboration between the participants is very challenging and could require the presence of a third party. In fact, despite blockchain is usually presented as a technology able to transform digital services by removing the need for every kind of intermediaries, it is more likely to change the nature of intermediation by reducing the market power of intermediaries, and by progressively redefining how they add value. (Hawlitschek et al., 2018). Despite the attention gathered by this topic and the increase in the appearance of business ecosystems based on blockchain platforms in practice, a clear definition of what are blockchain platform ecosystems and how they can be created is still missing (Schneider et al., 2020). Some authors started addressing the problem of studying blockchain platform ecosystems created by a single company, analyzing how the technology could mitigate the dominant position of the platform owner (Pereira et al., 2019; Schmeiss et al., 2019). However research is still missing on blockchain platforms in which there is not a clear platform owner, but instead, the platform is created and managed by a group of different companies who can also be the users of the platform itself. To address this scientific gap, we study a real case that emerged in the Italian banking sector: the ABILabChain project. The article describes the process that brought to the creation of the blockchain platform, from prototypes to pilots and live deployment. We describe how a blockchain platform ecosystem is created, which are the key subjects involved and their role, with particular attention to the role of the platform provider. We illustrate also how the governance of a decentralized platform can be structured. Finally, to define the features of blockchain platform ecosystems, we give an overview of the key differences between a platform run by a single company and the ones managed by a large ensemble of actors. The research is based on an exploratory case study. We conducted semi-structured interviews with the main actors involved in the project: the Italian Banking Association (ABI), ABI Lab, NTT Data, SIA, and several Italian banks. The blockchain platform of ABILabChain is now live and the relative ecosystem is composed of 91% of the Italian banks in terms of employees. The project, promoted by ABI Lab, started addressing the streamlining of interbank reconciliation and led to the creation of one of the largest blockchain platform ecosystems worldwide. Now ABILabChain intends to develop new applications, exploiting the platform that has been created. The Italian banking sector is not new to collaborative projects, but what makes ABILabChain distinctive is the pre-competitive approach and the aim to involve the entire Italian banking sector.

By describing a blockchain platform controlled by its users and how it has been created, we aim to contribute to the debate on blockchain technology's transformational impact, from a platform perspective. These findings can also help companies that are still struggling with the great effort of creating blockchain platform ecosystems, together with the still unclear understanding of how they can create value. The remainder of the paper is structured as follows: in the theoretical background, we analyze platforms' concept, we introduce blockchain technology and we present the literature that covers the combination of the two topics. Next, we present the study's methodology, followed by the results presentation and the discussion in light of previous literature. In the last section, we offer some conclusions and discuss the limitations of the research.

## **THEORETICAL BACKGROUND**

Blockchain has been introduced by Nakamoto (2008) as the underlying technology of Bitcoin. In October 2008, in the middle of the crisis of the U.S. financial system, Satoshi Nakamoto published his idea of a peer-to-peer electronic cash system “based on cryptographic proof instead of trust, allowing any two willing parties to transact directly with each other without the need for a trusted third party.” With Bitcoin, for the first time, value could be reliably transferred between two distant, untrusting parties without the need of an intermediary (Catalini and Gans, 2016; Zamani and Giaglis, 2018). Since then, many other cryptocurrencies started emerging, replicating some characteristics of Bitcoin, like the ledger structured as a chain of blocks, and adding other innovative features like the possibility of creating complex smart contracts in Ethereum (Kher et al., 2020). Since the end of 2015, however, blockchain began to gain traction also as a separate concept from cryptocurrencies. Blockchain started to be considered a disruptive technology and both academics and practitioners began to deepen and investigate it. Emblematic, in this sense, is the cover of *The Economist* of October 2015, which defined blockchain as a “trust machine”, shifting the attention from cryptocurrencies to the underlying technology and its application to other use cases. The technology evolved and its applications went well beyond cryptocurrencies. Through the years, blockchain has been applied in many different sectors with an emphasis on the financial one. Nowadays blockchain not only is considered capable of generating impacts in many different use cases but is also increasingly defined by scholars as a foundational technology, which could bring to transformations similar to the ones brought by TCP/IP protocol (Iansiti and Lakhani, 2017). Blockchain can reduce transaction costs, generate distributed trust, and empower decentralized platforms (Hawlitschek et al., 2018; Chen and Bellavitis, 2020). As such, it could be an enabler of new business models that were previously unfeasible (Nowiński and Kozma, 2017), such as the ones brought by Distributed Autonomous Organizations (DAO) (Diallo et al., 2018). Of particular interest are decentralized business models and the ones that reduce the role of intermediaries (Catalini and Gans, 2016; Chen and Bellavitis, 2020). Blockchain can play a role also in the transformation of business ecosystem potentially offering more distribution of power than in platform-based ones (Schneider et al., 2020). Despite the relevance of the changes that blockchain could bring to business and management, current research is predominantly focused on technological aspects and practical applications (Weking et al., 2019; Klarin, 2020). Knowledge is lacking also for practitioners, despite the progress in the adoption of the technology, institutions still struggle to have a clear understanding of the benefits of blockchain and how to adopt it in their businesses or creating new business models based on it (Morkunas et al., 2019). Several institutions, spurred only by media hype, started developing projects and experiments, without having fully understood how

exactly blockchain could bring value. Efforts to apply blockchain to unsuitable use cases can result in little benefit and could negatively affect the perception of blockchain potential. Despite the need for a clear understanding of how blockchain can be used by organizations to create business ecosystems and how it can impact business models, a preliminary analysis of literature on this topic shows that the scientific understanding of the business application of blockchain is still fragmented and almost an unexplored ground. The implications of the adoption of blockchain still need to be investigated and observed in their empirical settings.

## **METHODOLOGY**

Given the limited number of blockchain platforms built by companies that have reached critical scale, an exploratory research approach is necessary. In particular, this exploratory research is based on a single case study design. The article takes an inductive approach to explore this emerging phenomenon (Gioia et al., 2013) to allow the development of a new theory based on the evidence presented in this case study.

### **Case selection and data collection**

To address the research question and the knowledge gap on blockchain ecosystems, we study a real case that emerged in the Italian banking sector: the Spunta Banca project. The research is based on an exploratory case study. The case was selected because of several reasons. First, it is one of the few Blockchain platforms developed by companies in which the control of the platform is shared by the participants and not centralized in the hands of a platform provider. Second, from secondary sources, it appears as one of the few projects that reached an operative maturity level and generated attention and discussion both on a national and international level. To collect data, we considered multiple sources of evidence: the main source includes primary data, gathered through semi-structured interviews. To better prepare the interviews and gather additional information we relied also on secondary sources. We conducted semi-structured interviews with the main actors involved in the project: the Italian Banking Association (ABI), ABI Lab, NTT Data, SIA, and 3 Italian banks involved in the project since its inception. The interviews started from a set of predetermined questions to drive the discussion but given the exploratory approach, we let the informants go beyond predefined questions.

### **Data analysis**

The interviews were recorded, transcribed, and will be analyzed adopting an inductive approach, also due to the exploratory nature of the study. The text is coded by using in vivo code and building an inductive coding tree. During the coding, we labeled the essential elements and data and then we grouped homogeneous codes in categories, to synthesize the different variables that emerged. Despite the inductive approach, we define more abstract concepts to contribute to the theory by using also the extant literature on ecosystems. Thus, the analysis is done comparing the characteristics of blockchain ecosystems with some of those already defined in the literature about business ecosystems.

## **RESULTS**

The results are presented following the main steps of the project that brought to the creation of the ABILabChain, from the selection of the first use case to live development.

### **The objective: a DLT platform for the Italian banking industry**

The project that led to the creation of the ABILabChain platform originates from the activities of ABI Lab, the Research and Innovation Centre of ABI (the Italian banking association). ABI Lab started research DLT in 2017, to describe its characteristics and potential applications, and use cases that could benefit ABI's members. Then, to better understand the technology, the research moved on to a more experimental phase: *"Then emerged the shared need by all to start getting your hands dirty - because the best way to understand something is to start putting your hands on it and then start doing as well as talking."* (MPS).

The objective of the project was then to create a DLT platform that could offer to banks the opportunity to streamline processes and increase dialogue e interconnection within the ecosystem to ensure added value to all participants. Each bank would have to participate in the platform with a node being able to promote use cases and benefiting from the advantages offered by DLT.

### **The first step: the selection of the first use case**

To start with the making of the platform, it was necessary to choose a use case to begin with. The choice of ABI Lab did not fell on a business process, a choice previously pursued by other DLT platforms, but instead on a back-end one: interbank reconciliation (Spunta).

The interbank reconciliation procedure in Italy is linked to processes traditionally carried out by the back office and are aimed at reconciling the transaction flows that generate accounting entries in the mutual accounts in Italy and at managing pending transactions. Until that moment, reconciliation was based on bilateral registers with a low level of standardization and operating processes that were not very advanced.

ABI Lab did not choose the process of Spunta for the potential economic benefits that could have emerged by its improvement, present but of little relevance. Spunta was considered more as a mean to build the foundation of the platform: *"My idea from the beginning was that it was a Trojan horse, ... it is not the Spunta that interests us, but the fact that we have put together 99 banks that talk."* (Banca Mediolanum). Indeed, Spunta is a process that impacts all the banks. Every bank must manage interbank reconciliation. In addition, interbank reconciliation is not a highly regulated process and the operative rules that regulated the process were directly defined by ABI itself. This prevented the project from being slowed down by regulatory obstacles: *"If we started with payments or checks, it meant involving the regulators and the Bank of Italy, it meant holding a thousand meetings from the point of view of the process, compliance, AML ... that is, the project would have stalled."* (NTT Data).

### **Technology provider selection**

The project began with a feasibility analysis from a business and technological point of view: *"to check if the intuition we had of applying DLT to Spunta really made sense"* (ABI Lab). In this phase, ABI Lab realized the necessity to engage a technology provider that could assist the project development. For this reason, ABI Lab involved its technology partner asking to present an offer to do the feasibility analysis. ABI Lab selected the offer of NTT Data that in the following 3 months analyzed the process and the technology providing a first idea of how a proof of concept could be made.

Having received confirmation of the soundness of the project ABI Lab announced a second more structured tender to select the company to entrust with the creation of a proof of concept. The goal of this session was to provide a real Proof of Concept based

on the previously approved use case. Companies were required to issue a project proposal that could terminate with a Proof of Concept.

For the second tender, ABI Lab appointed a committee composed of one representative for each of the 14 banking groups involved at that stage. The decision to appoint a committee lengthened the time required the tender but was essential to state the ecosystem nature of the project: *"I still remember it; we were in the suburbs of Milan under an underpass when Romano told me: «We have to build a good tender». I was desperate: «But how? so we lose two months! It's not possible, we have to run!». But the fact that we made such a critical step so robustly was really a great strength and, in my opinion, we chose very well".* (ABI Lab).

Having received all the offers ABI Lab shared the offers with the banks and organized a meeting to discuss the variables to use in the evaluation of the offers. Then the banks voted on the selected weighted axes such as price, competence, international visibility, system integrator knowhow. The result of the vote was another time in favor of NTT Data. Worth considering that all the banks presented the same rankings of the offers, a full consensus was achieved naturally: *"And the interesting thing was that NTT won, as is now known, but the ranking was the same for each of the respondents: the first was the first for all, the second was the second for all and so up to the fifth"* (ABI Lab). NTT Data's output was a matrix considering the requirements from the use case side and the characteristics of the available technologies on the other side: this Proof of Concept has been the subject of the second phase that took place from December onwards.

### **Definition of the Use Case POC**

The focus of the second phase has been more operative: sub-phases have been defined, respecting the decisions that have been taken in the first phase about the TO-BE processes. In other words, Spunta Banca DLT has been tested from a logical point of view, considering the feasibility in all the possible scenarios and configurations.

Banks have been engaged to define the desired User Experience and the Use Case started to be developed: *"The initiative was of ABI Lab and we have done at least three or four meetings in the head office (at the time they could still be done) and we put on the table all of our operational process as well as indications according to us very important that they could not be excluded from the application that was being built."* (Iccrea Banca).

In particular, from 5<sup>th</sup> to 20<sup>th</sup> December 2017, NTT Data and ABI Lab interviewed the fourteen banks to collect their prerequisites and understand how they would have implemented the new solution: *"For the first part we were given 15 days to make a first study of the use case, so to understand well how each bank had implemented the Spunta. We toured all over Italy, we got to know all the offices of the Italian banks ... So we first had a meeting with them, gathering the requirements, designing the solution and a thousand meetings in between. When you have 14 banks at the table, each with its own systems because Spunta already existed before and therefore they had each already implemented their own system, it was not at all trivial to make a collection of the requirements. You went from old ones, in which there is the cursor and you move only with the keyboard, all black with green letters, the one just like the Matrix, [...] to others in which they said to you "We just changed this, we just bought it!". These are the nice things about working in distributed environments."* (NTT Data).

This project phase has been crucial to design Spunta Banca DLT in order to make the incumbent integration process as smooth as possible: *"We made sure that all the*

*specificities we had encountered in recent years were highlighted on this aspect. ABI Lab was very effective in making all our indications their own.” (Iccrea Banca).*

Several components that now characterize the new Spunta Banca DLT application have been collectively decided and designed in this phase: *“We met all the banks to collect requirements. We collected everything, condensed, interpreted, informed, read, and then arrived at the monthly meeting with proposals. And so we said, “You asked for this. Proposal 1 or Proposal 2? You asked for this. Proposal 1 or 2? “. And then we went to vote so the banks also had this moment of voting for every proposal we made.”* (NTT Data)

### **The definition of the technical infrastructure**

All along with the POC definition, ABI, NTT Data and the banks have to appoint the providers of the technological infrastructure and the operating systems, considering the both requirements and constraints of the use case and the development status of the technology at that time. In this regard, SIA and Corda have been chosen to support the development of the project and the platform itself. A close relationship with R3 has been crucial to allow Corda protocol to evolve as well considering the needs that have been highlighted by the banks after the User Acceptance Tolerance.

The project started when other initiatives were already active in the Blockchain and DLT landscape, having access to considerable investments. Although their competitive advantage could seem a threat in case of expansion in the fintech industry, for ABI Lab this represented an opportunity to exploit their knowledge and advanced development stage. However, on the technical side, all the initiatives were facing the same limits, being the technology very rough and unexplored in this field. For example, when ABI Lab started the research, Corda Enterprise had not been released yet.

### **POC Testing**

The POC has been tested with an initial User Acceptance Tolerance session, in which ABI Lab performed monitoring activity and collected the feedback from the banks that would have run the ABILabChain from the production phase onwards.

The output was a collection of qualitative, quantitative, and functional elements in order to conduct a cost-benefit analysis of Spunta Banca DLT not only as a technological solution but also as a business case. From a technical perspective, a preliminary UAT with 14 nodes and 40 operators revealed that several improvements were needed from the operative system side: the Corda protocol was not ready to sustain such an amount of transactions at that time and for this reason a side stream startup up to develop the - currently adopted - Corda Enterprise.

### **Pre-production phase**

Spunta Banca DLT use case and the ABILabChain have been tested from a technical and operative point of view for two months, during which also improvements have been done to consolidate the business case. Indeed, the second UAT aimed to test the ABILabChain infrastructure on 60 days of data upload and 1,5 million transactions: although successful, it was evident that to support up to 365 days of activity and 200 nodes, there were improvements to be brought on the SIANet. In October 2018, a new side stream with SIA started up to introduce new functionalities such as disaster recovery and storage to ensure a higher level of reliability to the users.

In the meantime, ABI and its member banks cooperated to draft and approve the new Interbank Agreement under the name of Capitolo 18bis. The new disposition has been approved by the ABI Executive Board on 15<sup>th</sup> May 2018 and the final publication

occurred on 13<sup>th</sup> June 2019. In particular, the new agreement represented an opportunity to update the old regulation upon the process of reconciliation, embracing both the ownership of reciprocal bank accounts and the new Spunta Banca DLT solution. Before moving to the final migration of all the banks on Spunta Banca DLT, in the fourth phase, it has been settled the governance structure, the different roles, and responsibilities to make the solution work from that moment onward. Several meetings have been necessary also to collectively define the onboarding process, the legal framework, and the responsibilities of each actor.

### **Use Case production**

Almost all the banking sector has been onboarded on three waves, starting respectively on 1<sup>st</sup> March, 1<sup>st</sup> May and 30<sup>th</sup> September 2020. During the first wave, 32 banks of the 17 pilot banking groups decide to participate. The second wave assisted the onboarding of other 23 banks, touching 82% of the whole banking sector onboarded. Finally, in the last wave, other 45 banks join Spunta Banca DLT, constituting a network of 100 banks in total. After having adopted the ABILabChain, banks are required to participate in periodical meetings in order to collect feedback and continuously improve Spunta Banca DLT.

### **DISCUSSION**

This work aims to understand how a platform based on DLT could be realized and what is the role of the platform leader. The analysis of the case of the ABILabChain led to a clearer view on the process of creation of such platform and on the understanding of the practices followed by ABI Lab in its role. ABILabChain could be considered as industry platforms or platform ecosystems following the definition given by Gawer and Cusumano (2014). ABILabChain provides banks with a common technological infrastructure providing foundational building blocks upon which they can develop complementary products and services. These industry platforms, as described in previous literature, consist of two basic types of firms: platform owners or large firms who provide the technology foundations and resources, and complementors that are typically specialized firms creating innovative applications which are crucial for the success of the platforms (Cusumano and Gawer, 2001; Lan et al., 2019). Taking steps from previous literature addressing the topic of industry platforms we highlight how the role of the platform leader in a platform owned by the participants could differ from the one of the platform provider. In particular, we structure the discussion starting by analyzing the role of ABI Lab as a platform provider and then reproducing some of the “Effective Practices for Platform Leadership” presented in the work of Gawer and Cusumano (2014) trying to understand how these practices could be applied also in the case of a platform not owned by the platform leader.

### **The shift from the role of “platform provider” to the one of “platform orchestrator”**

We find that, through the use of blockchain technology, the role of the platform provider could change reducing its power over the platform in favor of the customers. This could be compared to digital platforms created by consortia of multiple actors. In contrast to centralized digital platform ecosystems, consortia typically imply a distribution of power over multiple stakeholders. These stakeholders jointly define, establish, and maintain governance mechanisms for the digital platform ecosystem. (Bazarhanova et al., 2020). In the ABILabChain project, the role of a platform leader remains as the actor in charge of organizing the connection between different stakeholders. We may



frame this shift as a move from a "platform provider" to a "platform orchestrator" that organizes the activities around the design and the set up of the platform leaving the decisional power to the future customers since the beginning. The platform orchestrator does not act as an intermediary aiming at extracting value from the interaction that takes place on the platform. This reflects in the role of ABI Lab being the star point of the project for the benefits of its own members.

### **The property of the platform should be shared between the participants of the ecosystem**

The idea of shared ownership of the platform is reflected in the management of the intellectual property of the first use case implemented: Spunta software as a patent is deposited under the name of ABI but the intellectual property is shared with all the fourteen founding banks. Therefore, although there is not legal joint responsibility, it is clear that this mechanism has the goal of maintaining all the banks cooperating for the development of the project. Still not all the participants share the ownership of Spunta, banks that have been onboarded from the second wave on are distinguished from the founding ones by the fact that they do not share the intellectual property on Spunta. Nevertheless, they adhere to the same rules and are supposed to actively participate in the periodical meeting to provide their feedback and collaborate on new developments.

### **The platform should involve all the actors of the ecosystem at the same conditions**

The platform should be designed from the beginning aiming at the involvement of the entire ecosystem of companies. Having embraced the concept of shared ownership, it was easier for ABI Lab to make all the banks signing the same onboarding contract. Indeed, if on the one hand, ABI Lab was inviting members to provide their requests in terms of policy and contractual terms, on the other side it was putting effort in combining them in order to find a compromise that all the banks could agree and respect. The fact that the contract is identical for all the members reinforces the idea that there is no difference among them in terms of vote or bargaining power. In particular, it becomes more evident that banks are not buying a mere software implementation or installation, in which it is conceived a minimum level of customization according to the single bank's constraints, but they are having access to the same product. In other words, sharing a ledger means that both the functional rules and the contractual terms must be the same for all the participants to make the network work properly. The grounding of ABILabChain lies in the fact that those rules are defined collectively by the members themselves with the supervision of an orchestrator. It is the expression of a distributed solution also in the governance setting.

### **Choose a simple process that involves the whole ecosystem**

We find that the selection of the first use case around which building the platform is crucial for its success. Considering the inclusive purpose of the platform, the use case should be related to an activity that all the companies can connect to. Moreover, the choice of a simple use case that can be implemented without impacting everyday business operations of the companies involved can facilitate the achievement of standardization of the activities already in place in the various companies. The use case should also be selected to avoid incurring regulatory obstacles that could slow the development of the platform.

### **The choice of third parties should be functional to the involvement of the ecosystem**

To develop a shared infrastructure that could connect all the Italian banks it was necessary to involve in the project a technical partner that already had the competencies to create such infrastructure without rebuilding it from scratch. The choice of onboarding SIA was functional to replicate with Spunta the concept of the already operating SIANet, the technological infrastructure at the base of the Rete Nazionale Interbancaria (RNI – National Interbank Network). This network is the base for the interbank data transmission network system, which is the system enabling electronic transmission of data and information flows related to the execution of banking and financial operations on an international scale. The RNI protocol is also an international standard adopted by European banks for the secure exchange of financial data. Similarly, through the ABILabChain, which is built on the SIACChain, ABI Lab wanted to link all the Italian banks to facilitate a recurring back office process and create a common standard for all the members.

## **CONCLUSIONS**

This study analyzed the case of a platform ecosystem built on blockchain technology in which the platform leaser is an “orchestrator” more than a “provider”. From an academic perspective, this research contributes to the literature on platforms and blockchain applications. From a practitioner's perspective, this research highlights the role of a platform orchestrator and the main decision taken in launching a platform that it does not own or control. This study has several limitations, which open up avenues for further research. The main limitation is related to the generalizability of the achieved results, even though it is consistent with the exploratory nature of our work. In fact, the focus on only one case of platform development in a specific context, like the Italian banking industry, could lead to difficulties in the generalization in other contexts. Further developments could be accomplished to fill this gap. It would be useful to explore other cases of platforms structured in a similar method in another context.

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