The Internet of Banking and the Revolution of the Banking System through Blockchain: The case of the Spunta Banca DLT project

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The case of the Spunta Banca DLT project

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Abstract. Blockchain technology has gained considerable momentum in recent years which has led to an increasing adoption due to its distinctive characteristics such as decentralization, security, transparency, and reliability. Given this trend, extensive attention from both practitioners and literature has been dedicated to the opportunities and advantages of blockchain implementations as means of creating new forms of platform ecosystems. Despite, such initiatives, tangible results based on successful case studies remain limited. The objective of this research is to contribute to the current debate by empirically exploring the drivers that determine success in the development of platform ecosystems using blockchain. The research provides an in-depth analysis of the Spunta Banca DLT project, a project started in 2017 that implemented an inter-organisational platform based on blockchain technology within the Italian banking sector for the management of the interbank reconciliation process. Qualitative interviews were conducted with project participants to gain important insights into the platform development process and the use of the technology. Based on the findings gathered from the interviews, the main actions and procedures taken that led to the successful development of the new system were highlighted.

Keywords: Blockchain, Distributed Ledger Technology, Digital Platforms, Platform Ecosystem, Banking

1 Introduction

The use of blockchain today generates immense appeal due to the opportunities associated with this technology that apply to a variety of fields. Blockchain enables the creation of decentralized digital databases through a mix of cryptography and computer protocols that store and move information following pre-determined sets of rules without the need for intermediaries (Ali et al., 2020; Kołodziej, 2019). Data stored are considered tamper-proof and the need for a central authority that manages the system is eliminated, allowing transactions between untrustworthy parties in a peer-to-peer manner (Ali et al., 2020; Malhotra et al., 2021). Blockchain has the potential to provide unique benefits such as transactional privacy, transparency, risk reduction, fraud minimization which is why there is an increasing list of public and private organizations investing in its applications (Catalini & Gans, 2019; Frizzo-Barker et al., 2020; Saheb & Mamaghani, 2021). Nevertheless, despite the increasing attention being given to blockchain, the number of studies based on successful application is very limited. From an empirical point of view, the business application of blockchain is fragmented and almost an unexplored field and few projects implemented on an industry level have reached an operative maturity (Saheb & Mamaghani, 2021; Vella & Gastaldi, 2021).

In particular the banking sector is regarded as one of the most interesting domains in which the technology promises to address various issues due to many intermediaries and document exchanges involved such as intra-bank transfers (P2P payments), financial transactions, know-your-customer processes, data protection and ownership (Ali et al., 2020; Stasi & Attanasio, 2021). The blockchain has the potential to revolutionize the traditional banking system by increasing efficiency and transparency and resolving the problems of trust, security, and control (Ali et al., 2020; Garg et al., 2021; Harris & Wonglimpiyarat, 2019). One of the most interesting applications of blockchain concerns the creation of a platform-based business ecosystem through the development of a digital infrastructure shared and managed by all banks. Such platforms would allow banks to simplify their processes by drastically reducing the time and cost per transaction, as well as improving efficiency and security (Catalini & Gans, 2019; Vella & Gastaldi, 2021). The use of blockchain technology can help to overcome previous concerns about intermediaries having too much power in shared platforms by creating a system that does not need central control but distributes power equally among participants (Catalini & Gans, 2019; Pereira et al., 2019).

Although blockchain seems to provide great benefits, the domain of research into the use of technology is still in its early stages and there are various challenges such as lack of interoperability (Malhotra et al., 2021), absence of proper infrastructure and understanding (Spahiu et al., 2021) and need of proper regulations (Stasi & Anastasio, 2021) that need to be tested to assess the actual opportunity of use within complex sectors such as the banking. Whilst current studies are limited in terms of success stories, this paper will showcase a successful example of using blockchain to build up a platform ecosystem within the banking industry known as the Spunta Banca DLT project, which was promoted by the innovation division of the Italian Banking Association (ABI Lab) and was implemented as an inter-organisational platform within the Italian banking sector for the management of the interbank reconciliation process between Italian banks. In doing so, through an exploratory approach we answer the following research question: *what are the drivers leading to a successful blockchain-based platform adoption in the banking system*? This work aims at expanding existing literature by providing interesting theoretical considerations on the benefits and challenges of blockchain technology applied to build inter-organizational structures at the industry level. From a managerial point of view, the contribution of this research concerns the provision of an inspirational example that can serve as a guide on how to develop and implement this technology on an industry level within the banking sector or sectors with similar characteristics, providing the analysis of an innovative use case.

2 Literature Review

2.1 Blockchain

Blockchain has played an integral part in what different scholars consider the emergence of disruptive technologies, which they name as "Industry 4.0" (Hou et al., 2020). What makes blockchain revolutionary is its distinctive way of storing and managing data through a distributed database where every transaction is accounted for and considered secured of tampering (Zheng et al., 2018). The data entered is irreversible, transparent, and immutable, which makes blockchain a unique way of

sharing information amongst different parties, especially in the case of lack of trust between parties or when high degrees of trust are required (Hawlitschek et al., 2018). Smart contracts are an integral part of blockchain through which execution is based on predetermined conditions just as regular contracts are executed automatically (Luu et al., 2016). Among the many domains that have benefited from the adoption of blockchain, banks and financial institutions are among the most promising areas of interest where blockchain can be of use. So far banks have mostly experimented with the usage of blockchain for fund transferring purposes and registrations (Andoni et al., 2019). Whilst some banks have incorporated blockchain for updating internal processes, others have chosen to make use of the technology for interaction with other banks (Cocco et al., 2017). Nowadays, blockchain research in the banking industry focuses on three main themes: creating empirical based models for strategic change, for practical reasons in terms of platform challenges, and specific applications based on potential benefits of the technology which are yet to be experimented upon (Arjun and Suprabha, 2020). Nevertheless, most of the research in this regard is very early on due to the lack of maturity of current projects, which requests continuous research in this regard to dilate our understanding of the full potential of blockchain in this sector.

2.2   Digital Platforms

In recent years, the competition between companies is moving from competition between firms to competition between networks of firms (Mukhopadhyay & Bouwman, 2019; Tan et al., 2022). Companies are shifting toward a more collaborative approach with their competitors within their value chain to improve efficiency, reduce risk and strengthen their competitive position (Adner, 2017; Ritala et al., 2014). This new approach that combines both collaboration and competition is defined in the literature as "coopetition" (Ritala et al., 2014) and the main goal is to enhance the value creation process (Mukhopadhyay & Bouwman, 2019; Ritala et al., 2014). These new types of relationships between companies rely on the use of digital technologies which have provided innovative connection possibilities. In this context, the concepts of "digital ecosystem" and "digital platform" have become a hot topic in the literature because they represent the inter-organizational structures that enable collaboration between companies (Tan et al., 2022). Digital ecosystems can be defined as a technology-enabled community of actors – people or organizations – that are interwoven and move toward a common goal through an open, flexible, informal, and demand-driven collaboration (Aulkemeier et al., 2019; Jacobides et al., 2018; Mukhopadhyay & Bouwman, 2019). Adner (2017) highlights three main features of an ecosystem: the alignment between parties, the multilateral connection and the value proposition. Digital platforms represent technology-enabled modular structures that aim to connect different entities through formal contracts and/or mutual dependency (Jacobides et al., 2018; Mukhopadhyay & Bouwman, 2019). Thus, digital platforms can be the structure of a digital ecosystem, but a digital ecosystem can also include different digital platforms (Tan et al., 2022). Combing these two concepts, Mukhopadhyay and Bouwman (2019) defines the digital platform ecosystem as a *"meta-organisation (collective of firms and individuals) around a digital multi-sided platform with a shared vision on the prosperity of the platform"* (Mukhopadhyay & Bouwman, 2019, p. 331). According to this definition, to be effective a digital platform ecosystem must present

tight integration, alignment between participants, and commitment to long-term goals ecosystem (Adner, 2017; Aulkemeier et al., 2019).

Among the risks which can prevent the success of a digital platform ecosystem two major obstacles relate to the level of trust between participants and the cost and the complexity of collaboration such as the capacity of all actors to fulfil their tasks, the level of involvement in pursuing the common goals and the acceptance of the roles within the ecosystem (Jacobides et al., 2018; Mukhopadhyay & Bouwman, 2019). The challenge of addressing such obstacles is multidimensional and can be traced back to the high complexity, difficulty in controlling the process and unintended consequences at a corporate level, which are very often associated with the introduction of new platform infrastructures (Hanseth and Ciborra, 2007).

2.3   Centralized vs. Decentralized Governance

A main element of distinction between digital platforms concerns the governance structure, which sets out the roles, responsibilities, and processes in the system (Aulkemeier et al., 2019). In particular, the platforms are distinguished into centralised and decentralised platforms based on the level of governance centralisation. *Centralised platforms* are characterized by a platform provider - also called platform owner, platform leader, or core firm - which manages and coordinates the system (Chen et al., 2021; Pereira et al., 2019). However, the literature highlights several drawbacks of this structure that can hinder the creation and success of platform ecosystems. First, the risk that the platform owner assumes an egoistic behaviour prioritizing its interest to detriment of the interests of other platform participants is a key barrier, in particular in industries where there is a low level of trust between companies which do not want to give up control power such as the banking one (Aulkemeier et al., 2019; Chen et al., 2021; Vella & Gastaldi, 2021). In addition, other problematic areas cited by the literature are security and ownership of data (Pereira et al., 2019; Vella & Gastaldi, 2021), agreement on the identity of the leader and the different roles (Adner, 2017; Aulkemeier et al., 2019), the fair distribution of value created (Aulkemeier et al., 2019).

Decentralised structures of governance overcome these barriers creating a shared infrastructure between participants without assigning market power to a third party (Catalini & Gans, 2019; Vella & Gastaldi, 2021). There is no platform owner, and the control power is distributed among participants. Usually, there is still an entity – defined as *"platform orchestrator"* (Vella & Gastaldi, 2021) - that sets up the platform and coordinates the different participants, but it gives up the decisional power to them (Chen et al., 2021; Mukhopadhyay & Bouwman, 2019). The community defines the rules, the roles, the activities, and the distribution of value through democratic systems such as voting or general meetings (Pereira et al., 2019). However, also this type of structure has its challenges such as a slow decision-making process (Chen et al., 2021; Pereira et al., 2019), the risk of not reaching an agreement between parties and the need for a high level of involvement and collaboration of participants (Chen et al., 2021; Pereira et al., 2019; Vella & Gastaldi, 2021). According to Spagnoletti et al. (2015) the governance structure depends on the social interaction that the platform wants to support, and three different social interactions are identified: information sharing, collaboration, and collective actions. Alternatively, Constantinides & Barrett (2014) focus on the challenge of combining heterogeneous interests and resources in the

development of inter-organisational structures and argue that the involvement of all stakeholders in the development phases of the platform is fundamental, ensuring that everyone's interests are represented.

2.4   Organizing Blockchain based Digital Platforms

Blockchain opens new possibilities for the development of inter-organizational structures, and it can potentially enhance the diffusion of cooperative forms of value creation within many industries, reducing complexity and costs among the value chain and increasing efficiency and transparency (Ali et al., 2020; Chen et al., 2021; Kołodziej, 2019; Pereira et al., 2019). This technology has the potential to build platforms which connect and coordinate different entities relying on a system which distributes authority and control power among community members dynamically without the presence of third-party control (Catalini & Gans, 2019; Vella & Gastaldi, 2021). Two main characteristics distinguish blockchain-based platforms: *trust* and *decentralization* (Ali et al., 2020). The application of blockchain does not affect only the governance system, but it also impacts the infrastructure level, moving from a centralized type of database to a distributed one in which the database is stored among the network and the verification process of the data is based on a pre-agreed consensus mechanism applied within a peer-to-peer system (Pereira et al., 2019).

Blockchain-based platforms differ based on their degree of openness and they can be divided into permissioned and permissionless networks. Permissionless or public networks are open, allowing everyone to join or quit the system through a self-certification system, while permissioned or private ones are closed groups that specifically select the participants (Garg et al., 2021; Stasi & Attanasio, 2021). The literature stresses that the adoption of blockchain technology to build inter-organizational structures could help to overcome several barriers related to traditional centralized platforms such as the need to assign control power to a party and the low level of trust between participants (Catalini & Gans, 2019; Davidson et al., 2018), the costs of intermediation (transaction costs) (Ali et al., 2020; Pereira et al., 2019) and the risks related to data privacy and network security (Ali et al., 2020; Catalini & Gans, 2019).The use of blockchain however arises new challenges both on an economic and a technical level that must be carefully evaluated, such as higher coordination and verification costs (Garg et al., 2021; Pereira et al., 2019), the need of strong involvement by participants (Chen et al., 2021; Harris & Wonglimpiyarat, 2019), scalability and interoperability problems (Garg et al., 2021; Saheb & Mamaghani, 2021), strategic and structural inflexibility (Malhotra et al., 2021; Pereira et al., 2019) and lack of proper laws and regulations concerning its operation (Herian, 2018; Malhotra et al., 2021; Stasi & Attanasio, 2021).

So far it can be concluded that despite there being given a great attention in the literature toward the possible application of blockchain to create inter-organizational structures, this field of research is not mature enough, and a general theoretical orientation is missing (Ali et al., 2020; Frizzo-Barker et al., 2020). This showcases the need to address the limitations of current studies through tangible examples powered by successful implementations of the technology in the real world in terms of creation of digital platforms, supporting new decentralized governance systems, adoption of digital transformation and its role in powering better platforms ecosystems.

3 Background of the Project

3.1 An Overview

The Spunta Banca DLT is a project promoted by the Italian Banking Association (ABI) under the supervision of the ABI Lab – the innovative division of ABI. The objective of the project was to create a shared infrastructure within the Italian banking sector – the so-called ABILabChain - that could host different initiatives (ABI Lab, 2020; Stasi & Attanasio, 2021). The working group for the development of the project was composed of 14 banking groups - representing 78% of the Italian banking sector in terms of employees. The first issue to be addressed by this initiative concerned the creation of a blockchain based platform for the management of the "Spunta" process, which refers to the process of interbank reconciliation of the flows and operations that generates entries on bilateral accounts to clear every mismatch in double-entry bookkeeping. The Spunta Banca DLT Project aimed to standardize and automatize the process between different banks, reduce operational risk, increase the transparency and quality of the process, and simplify audit activities (ABI Lab, 2020; European Payments Council, 2021; Stasi & Attanasio, 2021; Vella & Gastaldi, 2021).

Whilst the project began in 2017, the pre-production phase began in 2018, during which a general simulation was carried out, and the new inter-bank agreement to regulate the process. In October 2019, a performance test was carried out by simulating the use of the platform over 12 months with more than 200 million transactions between 200 banks - representative of the entire Italian banking system (ABI Lab, 2021). The blockchain platform chosen was the private, permissioned DLT *Corda Enterprise* by R3 and the platform adopted became fully operational in October 2020. By March 2021, the platform had reached 100 nodes - thus 100 participating banks and had processed 332 million transactions, 98.2 per cent of which were automatically matched (European Payments Council, 2021). The designed platform has 6 levels of governance in which each of the participating parties operates under different functions as depicted in Fig.1. The governance of the platform is decentralized - meaning the control of the platform is not controlled by a single entity but shared among all the participants. ABI Lab, even though was the initiator of the project and set up the platform under the role of business network governor, essentially acts as a coordinator without exclusive decision-making powers (Vella & Gastaldi, 2021).

Governance Layer	Function	Actor
Business Network	Community who operates on the platform	Banks
Business Network Governor (BNG)	Entity who builds, coordinate and manage the business network	ABI Lab
Business Network Designer (BND)	It develops blockchain applications and takes care of operational support	NTT Data
Business Network Operator (BNO)	It provides one or more application services and takes care of service desk functions	SIA

Fig. 1. Spunta governance layers

3.2   Process and Regulation

"Spunta" refers to the process of interbank reconciliation of bilateral accounts that banks hold with each other to clear every mismatch in double-entry bookkeeping. Within the Italian banking sector, this operation was governed by an interbank agreement signed in 1978 and updated with amendments in 1994, so both the process and the rules governing it were outdated (ABI Lab, 2021).The reconciliation process was carried out monthly, according to bilateral agreements between the different banks, where usually the "Spunta owner" was defined, i.e., the bank in charge of the reconciliation process for a given period. Only the owner had full visibility of the transactions. Each bank had a customized system to manage movements and identify suspended transactions, and different bilateral agreements had different rules for recognizing and suspended transactions. In addition, there was no structured communication process between the banks to investigate suspended transactions.

The new system adopted has revolutionized the interbank reconciliation process, introducing daily reconciliation, standardizing, simplifying the process and defining unique rules shared by the entire system. Each bank in the network has installed its data centre and it represents a node in the system, all nodes being interconnected. The nodes communicate with each other automatically through blockchain protocol according to pre-established rules and automatically check that the entries on the bilateral accounts match. Currently, the application allows more than 98% of transactions to be matched automatically and the process of investigating suspended transactions to be carried out within the application. Moreover, the new system allows both parties involved to have total visibility of transactions, although the figure of the "Spunta owner" remains. Regarding the regulation, since the interbank reconciliation is regulated by ABI, the adaptation was straightforward. The text of the new agreement was approved and communicated by the ABI executive committee in 2019. Concerning the relationship between the different actors, a single contract was drafted and signed defining the roles, responsibilities, and rules within the system. Fig.2. represents a summary of the comparison between the AS-IS and the TO-BE process.

AS-IS	TO-BE
Bilateral agreements between banks (biannual/triannual) to define who is the "Spunta owner", the bank who takes care of the process. Only the owner has visibility of all the movements	While remaining the owner of Spunta, both banks have visibility of the movements within the system
Different reconciliation process from bank to bank	Standardisation, simplification and transparency of the process between banks
Monthly reconciliation	Daily reconciliation
Customised reconciliation rules, different for each bilateral relationship between the banks	Shared reconciliation rules, formalised through the 'smart contracts' of DLT technology
Lack of unique and shared rules for identifying suspended transactions to be reconciled	Unique and shared rules for identifying suspended transactions to be reconciled
Investigation process of unstructured suspended transactions through e-mails and phone calls	Structured internal platform investigation process

Fig. 2. Comparison of AS-IS and TO-BE processes

4 Methodology

The selected design for this study is based on a single case study focusing on the in-depth analysis of the Spunta Banca DLT project. The emphasis of this design is the provision of a detailed and intensive examination of the case and the detailed analysis aims at providing insights that can be very useful for future projects in this field and important addition to the existing literature on the use of blockchain forming the basis for future theoretical analysis (Bell et al., 2018; Siggelkow, 2007). Considering the limited number of blockchain applications, a single case study allows the have a deeper understanding of the subject from an exploratory perspective.

Primary data were collected through semi-structured interviews which allow for a general interview guide, but also guarantee a certain degree of flexibility to deepen interesting concepts that might that arise (Bell et al., 2018). Among the 10 companies whose representatives were interviewed, all the levels of governance were represented. Both managerial and operational figures were interviewed as detailed in Table 1. The closing of the sampling process and interviews was made once theoretical saturation was reached resulting in a total of 18 respondents.

PRIMARY DATA				
	ID	**Governance Level**	**Role**	**Quantity**
Interviews	Interview A	Business Network Governor (BNG)	Research Analyst	18 respondents
	Interview B	Business Network Designer (BND)	Head of Blockchain Service Line	
	Interview C	Business Network Operator (BNO)/DLT Network Provider (DNP)	Head of Connectivity Services	
	Interview D	Business Network	Head of Operations	
	Interview E	Business Network	Operations specialist (E1); Accountant (E2)	
	Interview F	Business Network	Head of Process Innovation(F1); IT Functional Analyst (F2);IT specialist (F3)	
	Interview G	Business Network	Head of Interbank Settlement Service(G1); Operations Specialist(G2); Head of Demand and Project Portfolio Management (G3); Demand and Project Portfolio Manager(G4)	

				Quantity
	Interview H	Business Network	Innovation Specialist (H1); Operations Specialist (H2)	
	Interview I	Business Network	Senior Demand Manager - Innovation, Payment & Global Transaction Banking	
	Interview J	Business Network	Operations Specialist (J1); Institutional Banking Specialist (J2)	
SECONDARY DATA				
Archival documents	**Type of documents**			**Quantity**
	Internal reports, Project presentations, Press releases			200 pages

Table. 1. Dataset Overview

In addition, an interview guide with the main elements to be covered by the interview was compiled prior to the start of the interviews as represented by Fig.3 below:

INTERVIEW GUIDE		
Period	**Starting Question**	**Aspects**
Warming up	Describe me your position and your role in the organization	• The research (background, purpose, methodology) • Reassurance on compliance with anonymity criteria • The interviewee (position, tasks, work)
Exploration of the case	Describe me Spunta Banca DLT project from your point of view	• Differences between old and new system • Development of the project • Main factors of success of the project • Main challenges encountered
Exploration of future possibilities	How do you think the project can evolve?	• Scalability of the project • New projects under development • Possible applications of the technology
Finish	Do you have any other comment to make?	• Final thoughts • Clarification of sending analysis results and request for feedback • Acknowledgement and leave-taking

Fig. 3. Interview Guide

The data analysis followed the thematic analysis framework, which is based on the development of a coding system that emerges inductively from the analysis of the interviews' transcripts and is regarded as the most suitable method for qualitative analysis because it entails the certain degree of flexibility necessary to study different types of unstructured data (Bell et al., 2018). The first level of coding concerned the in-depth analysis of the individual interviews and the identification of concepts of interest

– the empirical themes - that reflects the respondents' view. The concepts identified in the different interviews were then compared with each other to pinpoint patterns and common themes according to two main criteria: the repetition across interviews and the relevance to the focus of the research question. The last step involved the aggregation of the conceptual categories in aggregated dimensions, which represented the main themes of the analysis based on the insights found in the literature and the research purpose (Gioia et al., 2012). Coding process was carried out using the NVivo software. From the interviews' transcripts 243 references were highlighted, which were combined in 18 empirical themes (1st level), then 7 conceptual categories (2nd level), and finally 2 aggregate dimensions (3rd level).

5 Findings

For the successful development of the platform two main drivers were identified. The first was Platform Governance, which refers to the set of actions related to the definition of roles, responsibilities and processes within the system and thus influences the operation of the platform and the creation of value within it (Aulkemeier et al, 2019). The second was the Platform Set-up - which concerns the setting of the platform and highlights the conditions and practices that led to the successful implementation of the platform, addressing the issues of the implementation and management of the technological infrastructure (Saheb & Mamaghani, 2021), the training of actors (Spahiu et al., 2021) and regulatory alignment (Herian, 2018). Subsequently, for each driver a set of success factors were identified as summarized in Table. 2 below:

PLATFORM GOVERNANCE		
Successful factors	**Main themes**	**Representative quotations**
Clear roles and responsibilities	Involvement of both managerial and operational levels of banks in the decision-making process	*One of the success factors was the clear allocation of roles - NTT data was given the role of developing the application, SIA/Nexi was given the role of managing the technological infrastructure and ABI Lab acted as coordinator of these roles, which were then established in a contract signed by all the banks.*
	Engagement of all stakeholders and equal treatment	
	Clear division of roles and responsibilities	
Willingness to decentralization	Eliminating the need for a unique controller to govern the platform	*There must be a desire to manage things in a decentralised way. For instance, if you make a blockchain but then there is only one company that manages everything, this could have been done with a centralised infrastructure.*
	Willingness to give up centralization	
Cooperative attitude	Creation of an ecosystem as per blockchain requirements	*There has been involvement from the outset. The banks have always*

Successful factors	Main themes	Representative quotations
	Great involvement and collaboration between banks	*shown great cooperation in this regard and this has been one of the great successes of the project.*
	Flexibility of banks towards reaching the common goal	
Continuous coordination	Platform governor as facilitator	*Perhaps the most unique element for me was working together, all as equals, getting together with so many colleagues and deciding together what to do. [...] ABI Lab considered all banks as being equal. This may not even be the case because there are bigger banks and smaller banks.*
	Easing the joint taken decision process	
PLATFORM SET-UP		
Successful factors	**Main themes**	**Representative quotations**
Integration	Centralising the development and the technical management in a single technology provider	*Now, to my knowledge, everyone has eliminated their own proprietary application and it has been possible to bring to this Spunta application all the prerogatives and particularities that everyone had put into their own application. The Spunta system, therefore, is the result of all the applications of the different banks and is a very solid application.*
	Standardized processes and operational capacities of the participants	
	Attainment of an integrated solution also addressing the modularity and autonomy of local infrastructure	
Test and Learn approach	Establishment of development phases for the project	*Let's say that we were trained during the test phase - we tried to do the various operations of analysis, sending suspensions, matching for operations that could be matched by hand - so the adaptation was easy because when the system went into production phase the functions were already known and could be accessed.*
	Learning how to operate the platform through test phases	
	Gradual implementation of the new system	
Legal uniformity	Definition of clear rules and compliance	*We had many meetings with the lawyers involved by ABI Lab and with the lawyers of each bank, so when it came to signing the contract, all the legal aspects had already been dealt with and defined, and no doubts were left open about legal and compliance issues*
	Agreeing in a single contract between all participants	
	Adapting specific regulation to the new system	

Table. 2. Summary of Findings

5.1   Platform Governance

Four success factors related to the governance were identified, namely: the clear definition of roles and responsibilities within the system, the decentralization of control power, the cooperation between different actors, and the coordinating role played by ABI Lab.

Regarding the ***definition of roles and responsibilities*** within the system, respondents pointed out that the establishment of a clear governance model, defining the roles and relationships between the different parties involved, was one of the main factors of the success of the project. Six governance levels were defined within the platform, each of which foresees a precise role and functions. According to the interviewees, these levels were necessary for the correct governance and functioning of the system. The importance of a clear governance model lies in the ability to precisely identify the boundaries of accountability. In this regard, the Interviewee C stated:

"With a governance system designed in this way, it is very clear where the boundaries are, what I have to do, what the software developer has to do, what ABI Lab, which governs the system, has to do, and so on".

Another key factor for the success of the project concerned the ***adoption of a decentralised governance model***. The interviewees pointed out that the idea of decentralised governance is essential in the development of platforms that use blockchain technology. Often, a major flaw in projects that implement this technology is that of creating a distributed infrastructure but adopting centralised governance. In addition, the adoption of a decentralized governance model facilitated the development of the platform because it removed the need to find an entity on which to centralise decision-making powers. All participants felt involved in the decision-making process and were able to advocate their interests. For instance, respondent B stated that:

"There must be a desire to manage things in a decentralised way. For instance, if you make a blockchain but then there is only one company that manages everything, this could have been done with a centralised infrastructure".

Moreover, another success factor was the ***strong cooperative spirit*** demonstrated by all parties, who proved to be very involved and cohesive in the attempt to reach an industry solution. The interviewees were aware that a major challenge of the project was to bring together actors who usually compete. The shared feeling that led to this strong cohesion between the participants was the belief that they were trying to achieve an important system-wide solution from which all the banks could benefit as a sector. In this regard, the words of respondent F1 are emblematic:

"The success factor is always to be found in those people who have a vision of how the world is going and also the ability to negotiate, to relate and to empathise [...] Taking a cue from the concept of 'co-opetition', there is indeed competition between banks, but if certain things are done together, we can save on investment, we can reduce time, and we can better mitigate risks".

In addition, at the beginning of the project, two barriers to development were identified: mistrust among participants and the need for coordination between banks with different needs and capabilities. In this regard, it is important to highlight how ABI Lab, as Business Network Governor, was able to take on a *facilitating role* within the project, coordinating all the actors involved but letting all decisions be taken jointly by all network actors. In this way, ABI Lab fostered a collaborative climate by ensuring equal involvement. For instance, F2, an employee of one of the banks, stated:

"I can say that perhaps the most unique element for me was working together, all as equals, getting together with so many colleagues and deciding together what to do. [...] ABI Lab considered all banks as being equal. This may not even be the case because there are bigger banks and smaller banks".

5.2 Platform Set-up

As regards the Platform Set-up, three primary successful practices emerged: the centralization of the technological integration, the adoption of a test and learn approach, and the collective definition of legal aspects.

Concerning the infrastructural aspect, from the interviews it emerged that *integration* was a major challenge for the project since within the Italian banking system there was a lack of standardisation of internal procedures and substantial differences in terms of technological level, also due to the different size of the banks involved. To overcome this challenge and enable the integration of the systems, the technological partners developed an integrated service solution for all banks that allowed each to manage its node and run its application. Interviewee C stated:

"By doing this type of integration we have brought a completely turnkey solution, so no bank had to worry about the shared infrastructure. The integration of the banks' legacy systems was all in all very simplified [...] Concentrating the technological issue on one subject instead of distributing it and making it a problem for all banks is the key to the success of applications of this type that involve communities of subjects because when we solve it, we solve it for everyone".

In this regard, another point highlighted concerned the education of the actors to the new system and technology through a *test and learn approach*. The technology partners were aware of the lack of knowledge of the banks and pointed out that projects often do not go into production because participants did not understand the technology or the benefits of it. To overcome this a long and structured testing phase was implemented before going into production, involving all actors from the outset, so that adaptation to the technology was gradual and by the time it reached the production phase all participants were familiar with the new system. In this regard, Respondent E2 said:

"Let's say that we had trained during the test phase where we tried to do the various operations, so the adaptation was easy because by the time it went into production, we already knew the system".

From a legal point of view, the interviewees emphasised that the success factor in overcoming the ***legal challenges*** of the technology was through a significant in-depth legal study that was carried out through the establishment of a working table between the lawyers of each bank, coordinated by ABI Lab's legal department. This made it possible to define all the legal aspects and to draw up a single contract signed by all the parties regulating the system. In this regard the manager of one of the banks, stated:

"The other important thing is the legal in-depth analysis conducted. We had many meetings with the lawyers involved by ABI Lab and with the lawyers of each bank, so when it came to signing the contract, all the legal aspects had already been dealt with and defined, and no doubts were left open about legal and compliance issues".

Lastly, as the banking sector is highly regulated, the legal aspect related to the use of technology is also accompanied by the issue concerning the need for regulatory adaptation. In the specific case of Spunta, the process of regulatory adaptation was straightforward since ABI Lab, the promoter of the project is also the regulator. However, it emerged that for the development of projects of this kind, it is important to have an alignment from a regulatory point of view, as stated by Respondent D:

"The coordination of different actors, both private and public, banks, technological partners, and the supervisory authority itself, to redefine the regulatory profiles is fundamental. I must say that from this point of view ABI Lab did an extraordinary job of coordination, but it was a non-trivial hurdle at the outset.

6   Discussion

First and foremost, the clear definition of the governance model, roles, and responsibilities within the system, guarantees the ability to identify precisely and easily the boundaries of accountability. This issue of role clarity seems to address one of the main barriers to the success of inter-organisational platform development highlighted in the literature, namely the cost and the complexity of collaboration (Adner, 2017). Moreover, the clear definition of roles and responsibilities can lead to a stronger alignment of participants, which is considered in the literature as a central element for the proper development of a digital platform ecosystem (Adner, 2017; Aulkemeier et al., 2019). Secondly, the analysis highlighted how the adoption of a decentralised governance model is in line with what is stated in the literature, according to which a central feature of blockchain technology is to enable the creation of a trusted environment without the need for centralised control (Ali et al., 2020), allowing to overcome barriers related to traditional centralised governance systems such as the need to assign control power to a party and the low level of trust (Catalini & Gans, 2019; Davidson et al, 2018).

Regarding the need for strong cooperation between the actors, a potential problem with the decentralised governance model highlighted in the literature is the need for a high level of involvement between parties (Chen et al., 2021; Harris & Wonglimpiyarat, 2019). The main driver of the cohesion was the belief that they could create a system solution that would bring important benefits to the banking sector. This new

collaborative approach - is referred to in literature as "co-opetition" (Ritala et al., 2014) and relies on the exploitation of digital technologies (Tan et al., 2022) such as blockchain. Additionally, crucial to the successful functioning of the governance model has been the role of ABI Lab as role of business network governor, which matches the figure of the "platform orchestrator" found in the literature, who sets up the platform and coordinates the different participants, but it gives up the decisional power to them (Vella & Gastaldi, 2021). Also, within the first set of findings, it is possible to analyse the governance of the project through the model of Spagnoletti et al. (2015), which links the right governance structure to the type of social interaction that the platform supports. The social interaction supported by Spunta Banca DLT project could be framed as a collective action since the participants in the project belong to the same industry, are subject to the same rules and competitive pressures, and act jointly to achieve a common goal. Starting from this, the authors point out two main success factors of a platform which supports a collective action: providing coordination mechanisms for negotiating goals and boosting loyalty among members; and integrating deliberation and voting functionalities in trusted environments to ensure transparency of the collective decision-making process (Spagnoletti et al., 2015) – which were evident in the role adopted by ABI Lab.

As regards to the success factors in the development of the platform, at the infrastructural level, the use of blockchain technology required a shift from a centralised type of database to a distributed one where the database is stored among the network (Pereira et al., 2019). Thus, the distributed nature of the technology requires the ability to parallel management of multiple separate infrastructures through the integration of different systems and the creation of shared infrastructure (Saheb & Mamaghani, 2021; Vella & Gastaldi, 2021). Fundamental to the proper functioning of this type of system is the standardisation of the participants' different systems and ensuring that they all have the same operational capacity. The key strength of the solution adopted by the Spunta project was to centralise the development and the technical management of the shared infrastructure in a single technology provider. Additionally, through the test-and-learn approach adopted, all the actors had the opportunity to know and understand the technology in a gradual and guided way. This made it possible to overcome the challenge highlighted in the literature of the lack of knowledge and understanding of the technology (Saheb & Mamaghani, 2021; Spahiu et al., 2021) which is closely linked to one of the barriers to the success of inter-organisational platforms, namely the capacity of all actors to fulfil their tasks (Adner, 2017). Lastly, from a legal point of view the success factor in overcoming the several challenges highlighted in the literature – such as governance and accountability, contract enforcement, data protection, privacy, and confidentiality (Herian, 2018; Malhotra et al., 2021; Stasi & Attanasio, 2021) - was the involvement and cooperation of all stakeholders to define all the legal aspects and draw up a contract signed by all the parties regulating the system.

Furthermore, as highlighted in the literature (Ali et al., 2020) and confirmed by the analysis of the Spunta Banca DLT project, the main benefit obtained from the use of blockchain lies in facilitating cooperation and the exchange of information between different actors through the creation of a secure and trusted environment for all participants, whilst avoiding the need to define a third-party authority who control the system. These specific characteristics make it possible to fulfil the three requirements

highlighted in the literature for the success of digital platform ecosystems: tight integration, alignment between participants, and commitment to long-term common goals (Adner, 2017; Aulkemeier et al., 2019). To conclude, it is evident how the Spunta Banca DLT Project through the chosen governance model, the coordination roles played by ABI Lab and the technological partners and the practices adopted in the development of the platform was able to achieve the three degrees of legitimacy defined by Constantinides & Barrett (2014) for the proper development and functioning of an inter-organisational structure: representing all interests at stake and find a common ground between them (pragmatic legitimacy); allowing participants to become familiar with the system (cognitive legitimacy) and making participants understand the value of the platform (normative).

7 Implications

7.1 Theoretical Implications

This research supports the existing literature on the use of blockchain for the creation of inter-organisational structures. The case of Spunta confirms the centrality highlighted in the literature of the governance model for the proper development and functioning of an inter-organisational platform. In particular, the adoption of a decentralised model allows overcoming the barriers associated with the traditional decentralised structure such as the need to assign control power to a party and the low level of trust between participants (Catalini & Gans, 2019; Davidson et al, 2018; Kołodziej, 2019), and the costs of intermediation (Ali et al., 2020; Pereira et al., 2019). Furthermore, the analysis showed that the successful functioning of a decentralised governance model requires the provision of coordination mechanisms for defining roles and responsibilities, negotiating goals, ensuring that everyone's interests are represented which is in line with previous research concerning the aforementioned themes (Constantinides & Barrett, 2014; Spagnoletti et al., 2015; Vella & Gastaldi, 2021). From an infrastructural point of view, the analysis confirms how the adoption of a blockchain system requires a process of standardisation of the operational capabilities of different actors and the ability to parallel management of multiple separate infrastructures through the integration of different systems and the creation of shared infrastructure (Saheb & Mamaghani, 2021; Vella & Gastaldi, 2021). Furthermore, another central theme in the literature confirmed by the analysis concerns the need to educate actors in the use of the new technology to overcome the barriers of lack of knowledge and understanding of the technology (Saheb & Mamaghani, 2021; Spahiu et al., 2021). Lastly, the analysis conducted showed how the use of blockchain is closely linked to the presence of an ecosystem since the main benefit obtained from the use of blockchain lies in facilitating cooperation and the exchange of information between different actors, whilst avoiding the need to define a third-party authority who control the system (Ali et al., 2020).

7.2 Practical Implications

From the analysis of the success of the Spunta Banca DLT project, it is possible to derive six main takeaways useful for the development of similar projects. First,

blockchain technology shows greatest potential when the main expected benefits lie in facilitating cooperation and the exchange of information between different actors through the creation of a secure and trusted environment. Secondly, it is important to adopt a decentralised governance model to make the most of the potential of the technology, whilst clearly defining roles and responsibilities and adopting coordination mechanisms to ensure alignment between parties and the functioning of the system. In this regard, a facilitating element is the presence of an entity that acts as a facilitator between the parties - the platform orchestrator - who sets up the platform and coordinates the different participants, but it gives up the decisional power to them. Thirdly, due to the distributed nature of the technology, a blockchain-based platform requires the integration of the different systems of the participants and the creation of shared infrastructure. Fourthly, it is important to provide education for all actors involved in the project and involving all actors from the initial testing phases can help them to know and understand the technology in a gradual and guided way. From legal point of view, the use of blockchain can raise the need to assess various issues. For this reason, the discussion and definition of the legal aspects among the participants in the project are important. Lastly, an important element that emerged from this study related to the importance of the managerial dynamics within this inter-organizational initiative. The involvement of managers in the decision-making process and their cooperative spirit should be highlighted as an important success factor for the implementation of the system.

8   Limitations and Future Research

There are two main limitations pertaining to this study which can be addressed through future research. Firstly, it should be noted that the results of this paper are based only on the analysis of the selected case study, therefore drawing generalizations from the conclusion may be limited, but can be addressed through future research within a similar domain. The second limitation concerns the specific geographical and regulatory context in which the use case is developed. In fact, since the banking sector is a highly regulated sector with great differences from one country to another, this study and its conclusions are mainly useful for contexts that present similar regulatory and cultural conditions. Regarding such limitations, a future comparative study with other similar initiatives, could provide more generalisable results and identify points of convergence and divergence.

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