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## Article

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# Best practices for blockchain-driven digital transformation in cross-industry settings<sup>☆</sup>

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## ABSTRACT

Digital transformation (DT) is complex and uncertain, particularly within traditional industries. Distributed ledger technology, such as blockchain, has driven DT across many global sectors. Despite its transformative potential, scaling blockchain solutions beyond pilot projects often fails due to technical, organisational and environmental barriers. Many failures stem from ineffective collaboration and strategic misalignment among ecosystem partners rather than from technology. This study examines collaborative processes and enabling capabilities required for successful DT by focusing on a longitudinal case study from Finland (2019–2023). The case follows a cross-industry, blockchain-driven DT initiative that achieved scale despite transitioning from private blockchain to centralised technologies after market entry. While the role of blockchain in this success has been documented (Saari et al., 2024), the ecosystem collaboration mechanisms and strategies for tackling challenges remain unclear. Using the technology–organisation–environment (TOE) framework, this paper analyses how DT unfolded across these contexts, identifying best practice strategies and enabling capabilities. The study draws on 35 interviews with key stakeholders and thematic content analysis to identify critical scaling enablers. Our findings reveal that scaling blockchain-driven DT in cross-industry settings requires 1) industry-level mindset and shared vision, 2) formalised collaboration and public–private partnerships, 3) governance structure with a sustainable business model and funding, 4) complementary ecosystem roles and an early-stage champion, 5) stakeholder training and support and 6) flexibility in technology and agile implementation. These elements show that trust and strategic alignment can emerge even among direct competitors, offering valuable insights for enterprises exploring blockchain innovation in business-to-business contexts.

## 1. Introduction

Digital transformation (DT) is a change process that is enabled by innovative digital technologies and strategic resource utilisation. DT aims to improve organisations and redefine stakeholder value propositions (Gong & Ribiere, 2021). Unlike incremental digitalisation, DT requires significant shifts in organisational culture, operational models and strategic direction (Gong & Ribiere, 2021), making it inherently complex and risky. These challenges are amplified in traditional industries in which established and mature business models predate digital era innovations. Organisational resistance, leadership gaps, skill shortages, a lack of standardisation, and resource-intensive implementation processes are often compounded by rapid technological

advancements and regulatory uncertainty (Butt, 2020; Chirumalla, 2021; Gupta, 2018; Ishfaq et al., 2022). Overcoming these barriers requires an adaptive organisational cultural shift, dynamic capabilities, such as resource reconfiguration, and collaborative strategies, such as shared governance (Vial, 2019; Zvolokina et al., 2020).

Blockchain, a distributed, append-only ledger secured through cryptographic mechanisms (Davidson et al., 2018), was introduced by Nakamoto (2008) as a foundational technology underpinning secure decentralised systems. Since then, it has been widely explored for industry-level DT applications due to its ability to facilitate change across organisational and global boundaries (see, e.g., Aliu et al., 2024; Alkatheeri & Ahmad, 2024; Casati et al., 2024; Leocádio et al., 2024; Topcu et al., 2023). Smart contracts on blockchain platforms can

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automate multiparty business processes, thereby enabling collaborative business models and value chains without a trusted party coordinating interactions. By reshaping coordination mechanisms and trust structures, blockchain offers industries new ways of organising production and redefining collaboration possibilities (Pólvora et al., 2020). Catalini & Gans (2016) suggest that blockchain can lower transaction

costs by reducing verification and networking frictions, and making cross-industry coordination more viable Davidson et al. (2018) position blockchain as an institutional technology that disintermediates traditional governance structures allowing firms to shift from hierarchical to market-based, or even decentralised, organisational models.

Enterprise blockchain adoption has evolved in distinct phases. Early implementations (2015–2017) focused on private and permissioned blockchains (e.g., Hyperledger Fabric, R3 Corda) as industries sought to test blockchain's potential in controlled environments. These proofs of concepts (PoCs) were particularly prominent in sectors such as supply chain management, finance and trade, in which firms aimed to enhance transparency, automate processes, and reduce intermediary reliance. Between 2017 and 2018, blockchain adoption moved towards pilot projects, yet few transitioned beyond testing. Many private blockchain initiatives struggled with governance fragmentation, interoperability issues and stakeholder misalignment, which all prevented large-scale adoption (Lacity & Hoek, 2021; Zavolokina et al., 2020). Recent trends (2020–present) indicate a shift towards public blockchains and hybrid models that combine public and private blockchains (Ethereum, Cosmos, Polkadot). Blockchain is increasingly integrated with artificial intelligence (AI), the Internet of Things (IoT) and big data, thus extending the technology's capabilities. Innovations such as zero-knowledge proofs and scalable Layer-2 solutions have overcome key technical barriers and solidified public blockchain's potential for enterprise adoption (Lacity et al., 2024).

Despite these advancements, scaling blockchain applications beyond PoCs remains a significant challenge. Issues such as data sensitivity, regulatory uncertainty and the need for substantial architectural changes have often resulted in 'pilotitis', in which pilot projects fail to transition into scalable solutions (Sedlmeir et al., 2022). High-profile business-to-business (B2B) blockchain initiatives such as TradeLens (shipping), We.Trade, Marco Polo and Contour (trade finance) struggled to scale due to reliance on private networks, leading to vendor lock-in, misaligned stakeholder priorities, and unrealistic expectations of universal participation (Bousquette, 2022; Digital Finance Media Limited, 2024; Lacity et al., 2024). These failures highlight a critical gap in the literature. While blockchain technology has matured, the most significant hurdle for successful DT is not the technology itself but the ability to collaborate with ecosystem partners across sectors to drive scalable adoption (Lacity & Hoek, 2021). Given that the existing literature focuses on failed implementations, there remains a lack of case studies examining successful blockchain-driven DTs that have scaled beyond the pilot stages.

This study examines a successful, cross-industry blockchain-driven DT by focusing on a longitudinal case study of Finnish apartment transactions and financing (2019–2023). This article applies the TOE framework (Tornatzky & Fleischer, 1990; Toufaily et al., 2021) to examine how ecosystem participants successfully collaborated and addressed challenges that arose during the DT process. Through this analysis, the best practices for scaling digital transformation (DT) in a multistakeholder environment are identified. This case represents a rare and unique example of blockchain-driven DT that successfully scaled in the risk-averse real estate sector, despite *centralised* technologies later replacing blockchain (Saari et al., 2024). Moreover, this analysis bridges the gap between theoretical recommendations and practical strategies by tracing the transformation across TOE dimensions over time, and highlighting best practices for successful DT.

The real estate industry provides a valuable context for understanding blockchain-driven DT, given its low digitalisation, strict regulations and reliance on intermediaries (Saari et al., 2024). These

industry characteristics offer a relevant case for analytical generalisation to other traditional, highly regulated industries facing similar challenges. By 2023, the Finnish DT platform covered nearly 98 % of the mortgage market and facilitated around 40 % of apartment transactions, demonstrating how the industry-level DT scaled (Saari et al., 2024). While previous research has thoroughly explored permissioned blockchain's evolving role in this successful DT (Saari et al., 2024), it remains unclear how the ecosystem managed challenges and collaborated efficiently to achieve success. This constitutes an opportunity to explore practical solutions for overcoming both general and blockchain-specific DT barriers.

This paper contributes to DT research by addressing the following research questions:

1. How does the DT process unfold across technological, organisational and environmental dimensions in a successful cross-industry blockchain-driven DT initiative?
2. What key enablers and best practices facilitate ecosystem collaboration and support the scaling of blockchain-driven DT for a traditional industry?

The analysis of rich, longitudinal data to extract best practices for collaboration in an otherwise traditional conservative sector is used to identify solutions to the challenges of scaling blockchain-driven DT. The identified strategies are compared with existing DT frameworks to advance the theoretical and practical understanding of blockchain-enabled DT processes.

Section 2 introduces the theoretical framework, and Section 3 outlines the case study and research method. Section 4 analyses how cross-industry DT developed over time and develops six best practices for successful blockchain-driven industry DT. Section 5 discusses the implications of these findings and provides recommendations for future research.

## 2. Theoretical framework

### 2.1. Technology–organisation–environment (TOE) framework

The technology–organisation–environment (TOE) framework has been widely employed in blockchain adoption literature as it provides a structured lens through which to examine how technological advancements interact with institutional structures and regulatory frameworks to facilitate DT (AlShamsi et al., 2022; Toufaily et al., 2021). Three dimensions that are particularly useful in the context of traditional or highly regulated industries are examined: technological readiness, organisational preparedness and environmental pressures. Unlike alternative models, such as the technology acceptance model (TAM) or diffusion of innovation (DOI), TOE allows for a system-wide perspective that incorporates both organisational coordination and external pressures that shape the adoption of new technologies in multistakeholder environments such as the real estate industry (Hadi Almaher et al., 2024).

Studies applying TOE to blockchain adoption in construction (Wu et al., 2023), logistics (Ganguly, 2024) and financial services (Malik et al., 2021) have reinforced its applicability to cross-industry, multi-stakeholder settings. A comprehensive review by Zhang et al. (2024) employing a TOE lens to blockchain adoption finds that its barriers are often technological (e.g. interoperability) or environmental (e.g. regulatory uncertainty); however, successful adoption often hinges on organisational enablers, such as interorganisational trust, collaboration and governance structures. TOE serves as an ideal tool to analyse how blockchains can be leveraged to transform traditional, regulated industries, providing valuable insights for other sectors undergoing similar digital transitions.

The technological dimension of TOE allows for an assessment of the capabilities and characteristics of blockchain technology and its relative

advantage in improving efficiency and transparency for housing transactions. Blockchain's potential for automation, security and immutability has driven adoption in industries with complex transaction networks (Wu et al., 2023). However, past studies on blockchain adoption have highlighted that technological readiness alone is insufficient for scaling DT. Kajla et al. (2023), for example, found that blockchain adoption in banking depended more on the organisational and environmental dimensions and less on technology. Gökalp et al. (2022) note that in supply chain management – another industry reliant on secure, multiparty transactions – technological advancements must align with organisational and environmental readiness to sustain adoption.

**Organisational dimension:** The integration of blockchains into industry ecosystems requires coordinated efforts among firms, regulatory bodies and financial institutions. Clohessy et al. (2020) emphasise that organisational learning and institutional adaptation are the keys to successful blockchain transformation, as firms must evolve alongside new governance structures and workflows. Malik et al. (2021) extend TOE by demonstrating that factors such as senior management support, organisational learning capability and cross-firm collaboration significantly impact adoption success. From an organisational perspective, paradoxical tensions between disintermediation and collaboration, the need to foster trust among participants, and readiness gaps in infrastructure and cultural shifts have been identified as significant hurdles to DT (Toufaily et al., 2021; Zavolokina et al., 2020).

**Environmental dimension:** The role of regulatory clarity, industry standards, and ecosystem readiness is a crucial determinant of blockchain-enabled DT (Akella et al., 2023; Jabbar et al., 2021). The literature suggests that limited network effects and regulatory ambiguity hinder ecosystem readiness, requiring clearer frameworks and broader stakeholder engagement. Hubenova et al. (2024) show that regulatory uncertainty and institutional resistance can slow adoption, even when technology is viable. Ganguly (2024) further highlights the importance of government support and external partner alignment in sustaining blockchain adoption in logistics, another industry characterised by complex multiparty transactions and strong regulatory oversight. Table 1 highlights the broad industry applicability of TOE in regulated, multistakeholder settings.

In sum, the TOE framework reinforces the need to analyse the interdependencies among technology, organisations and external pressures, making it an appropriate framework for studying how blockchain-enabled DT can scale beyond proof-of-concept (PoC) stages in highly regulated contexts, such as the Finnish residential property system – the focus of this study.

### 3. The case, methodology, and research design

#### 3.1. Case description and background

Finland's residential property system uniquely divides ownership into housing cooperatives and other tenures, with the former including two million owners in 1.4 million apartments covering the Finnish population of 5.6 million. Finland is an excellent case study choice, as it has a highly stable economy and government and its financial markets are well-trusted, as made evident by its AA+ credit rating (Fitch, 2025). The National Land Survey of Finland (NLSF) introduced the Residential and Commercial Property Information System (RCPIS) in 2018 to modernise housing cooperative transactions that historically relied on paper transactions. This central registry aimed to digitise records regarding ownership, pledges and loan granting. This regulatory push kickstarted the digitalisation of housing transactions and financing (Saari et al., 2024) and required industries (i.e. banks, authorities and real estate agents) to develop a solution for trading digital housing company shares, which replaced paper certificates. Stakeholders opted for a blockchain-based platform built on the Corda network, which is a decentralised, secure and scalable infrastructure. This platform enabled

**Table 1**

Summary of key studies applying the TOE framework to blockchain adoption.

Citation	Industry Applied	Research Aim	Geographical Focus
Hubenova et al. (2024)	Multiple industries	Explain blockchain non-adoption in global value chains	Global
Legesse et al. (2024)	National quality infrastructure	Identify factors influencing blockchain adoption	Ethiopia
Zhang et al. (2024)	Multi-industry	Identify factors influencing blockchain adoption and research trends	Global
Ganguly (2024)	Logistics	Identify challenges related to blockchain adoption in logistics	India
Mbadlisa and Jokonya (2024)	Food supply chain	Explore factors affecting blockchain adoption	Global
Wu et al. (2023)	Construction	Identify critical barriers affecting blockchain adoption	China
Kajla et al. (2023)	Banking sector	Identify factors influencing blockchain adoption in banking	India
Chittipaka et al. (2023)	Supply chain	Identify blockchain adoption factors in supply chains	India
Bag et al. (2022)	Logistics	Examine blockchain adoption and its impact on SMEs' financial and market performance	South Africa
Malik et al. (2021)	Multiple industries	Identify organisational blockchain adoption factors	Australia
Toufaily et al. (2021)	Multiple public and private industries	Investigate blockchain adoption challenges and expected value	Middle East and North Africa region
Gökalp and Martínez (2021)	Supply chain management	Examine determinants of blockchain adoption in organisations	Global
Kouhizadeh et al. (2021)	Sustainable supply chain	Explore blockchain adoption barriers	Global
Clohessy et al. (2020)	Multiple industries	Explore organisational blockchain adoption factors	Global
Clohessy and Acton (2019)	Multiple industries	Investigate organisational factors influencing blockchain adoption	Ireland

the banks to operate their own nodes, with an interface node connecting external parties, such as the Tax Administration and real estate agent portals. This facilitated easy integration, as illustrated in Fig. 1. The ecosystem roles (Alstyn et al., 2016) were as follows: platform owners (banks and tech startup), providers (banks serving platforms with user transactions and financing), producers (real estate agents and public sector actors such as the tax authorities and NLSF, thereby creating platform offerings), and consumers (homebuyers and sellers).

#### 3.2. Research design

Drawing on Toufaily et al.'s (2021) blockchain technology adoption framework, which is grounded in the TOE framework, this study employs a four-year longitudinal, revelatory case study (Yin, 1994, p. 199), to examine how the Finnish cross-industry ecosystem digitally transformed Finnish housing transactions and financing. This case was selected due to its nature as a rare, yet important, example of a scaled blockchain-driven DT initiative in a highly regulated, multistakeholder industry. Its selection allowed for an in-depth analysis of ecosystem collaboration, scaling challenges and evolution over time. The research

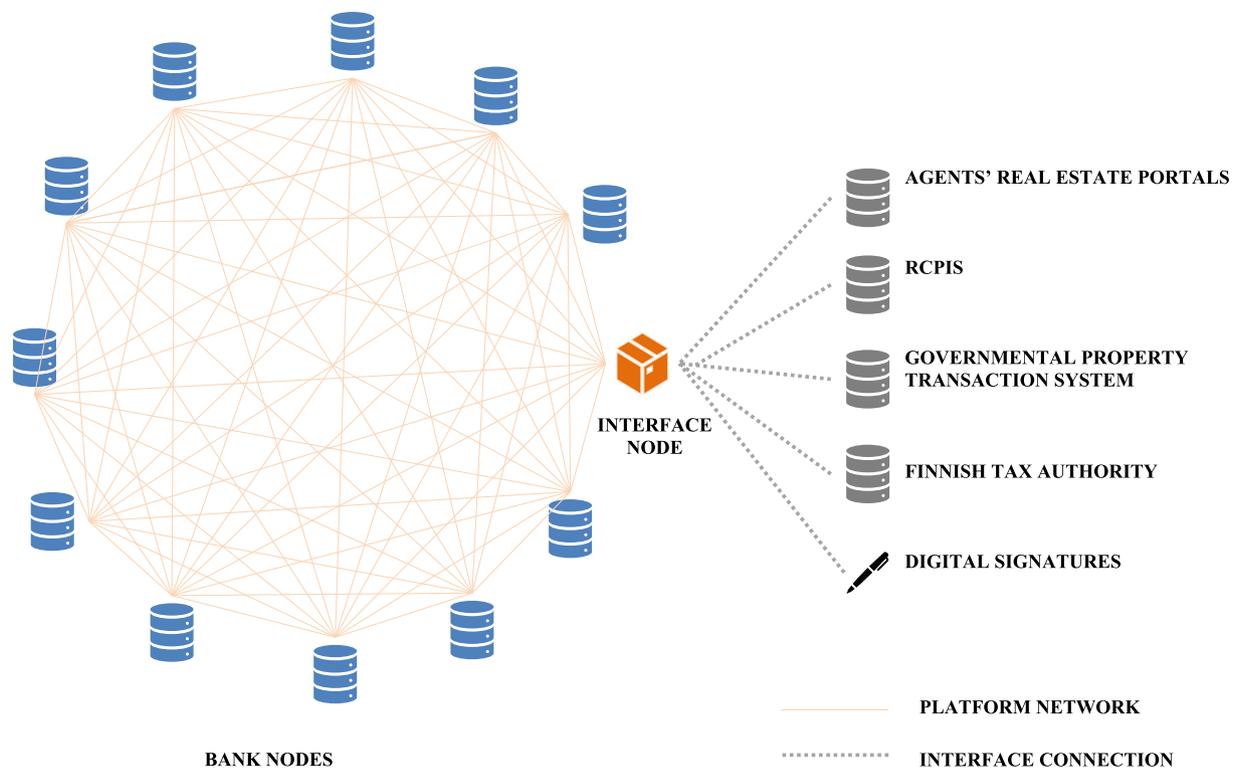


Fig. 1. The initial Corda-based solution. Adapted from Tomorrow Tech (2019).

identified best practices for similar traditional industries pursuing successful DT with blockchain. It followed a three-step design comprising two data collection rounds and a theory-enriching phase. The TOE framework informed the Phase Two interview protocol and guided thematic analysis by structuring findings into technological, organisational and environmental dimensions.

### 3.3. Data collection and participant selection

The data collection for this study occurred in two phases. Phase One focused on establishing a foundational understanding of the housing trade platform development through 10 loosely structured interviews lasting 30–60 minutes with bank representatives, real estate agents and governmental authorities. Phase Two followed the ownership consolidation and transition away from blockchain and employed Toufaily et al.'s (2021) framework as the basis for the interview protocol (Appendix A). Phase two involved 25 in-depth semi-structured interviews with representatives from banks, real estate agents, technology firms, public sector entities, startups, and end-users. The interview structure included three rounds: an initial open discussion on benefits and ecosystem value, a targeted round focused on theoretical aspects and a final round examining changes across the transformation process, as described in Appendix A. To ensure that comprehensive insights were obtained, participants were selected to represent the multistakeholder ecosystem broadly. Most interviewees were senior executives and senior managers making strategic decisions; around 40 % of the participants were middle managers and team leaders overseeing specific departments of projects, as shown in Table 2. In addition to interviews, secondary documents, such as press articles and banking presentations, were consulted to triangulate the findings and provide contextual insights.

### 3.4. Data analysis

The study employed thematic content analysis (Friese, 2019) to understand the overarching DT process by examining how the

blockchain-driven DT unfolded over time within the TOE framework and by studying the strategies used to address DT scaling challenges. This approach balances deductive, theory-driven coding with inductive theme identification; thus, it is practical for revelatory case studies in complex, multistakeholder ecosystems.

The initial coding process was guided by a preliminary coding scheme based on Toufaily et al.'s (2021) blockchain adoption framework. ATLAS.ti software was used to systematically identify key themes within interview transcripts. While the framework provided structure, the coding process remained flexible, allowing for the inductive emergence of new codes that captured the platform's development and strategic shifts in DT adoption over time across TOE dimensions.

The emergent codes were iteratively grouped based on thematic relevance. They were first divided into subcodes capturing specific aspects of DT evolution and then into broader code groups organised into code folders aligned with TOE dimensions. This process was refined by analysing the co-occurrence of codes and quotation counts; this ensured that the patterns were consistently identified across empirical data. The findings were further validated through triangulation with secondary data sources, including press releases and banking presentations, which provided additional contextual insights. Appendix B illustrates the code folders and code groups and provides an example of a quote with its quotation.

The final step of the research involved revisiting the coded data to identify key best practices and ensure that they were empirically grounded. These best practices were further refined in researcher workshops held from September 2024 to December 2024, where they were compared against existing DT frameworks to develop practical recommendations for successful DT in cross-industry settings.

## 4. Findings

### 4.1. Analysis of the Finnish cross-industry DT process across technological, organisational and environmental dimensions over time

Table 3 presents a chronological analysis of the DT process involved

**Table 2**  
Interview details from Phase One and Phase Two.

Date	Industry	Platform Role	Hierarchical Position	Duration (Minutes)
24.9.2019	Banking	Provider, owner	Leadership	60
26.9.2019	Public sector	Producer	Leadership	45
2.10.2019	Banking	Provider	Management	45
11.10.2019	Banking	Provider	Management	60
16.10.2019	Public sector	Producer	Leadership	60
16.10.2019	Technology	Provider, owner	Leadership	45
21.10.2019	Real estate agent	Producer	Leadership	30
29.10.2019	Banking	Provider, owner	Management	60
1.11.2019	Real estate agent	Producer	Management	60
11.11.2019	Banking	Provider, owner	Leadership	45
15.6.2022	End-user	End-user	Leadership	43
16.6.2022	Public sector	Producer	Management	89
17.6.2022	Real estate agent	Producer	Management	49
20.6.2022	Banking	Provider, owner	Leadership	40
21.6.2022	Banking	Provider, owner	Leadership & management	65
22.6.2022	Public sector	Producer	Leadership	87
22.6.2022	Banking	Provider, owner	Leadership	58
22.6.2022	Real estate agent	Producer	Management	36
1.8.2022	Banking	Provider, owner	Leadership	63
4.8.2022	Real estate agent	Producer	Leadership	42
8.8.2022	End-user	End-user	Management	28
10.8.2022	Society	Stakeholder	Leadership	57
10.8.2022	Public sector	Producer	Management	57
10.8.2022	Real estate agent	Producer	Leadership	58
17.8.2022	Real estate agent	Producer	Leadership	33
19.8.2022	Banking	Provider, owner	Management	41
19.8.2022	End-user	End-user	Management	52
19.8.2022	Technology	Provider, owner	Leadership	86
26.8.2022	Public sector	Producer	Management	47
1.9.2022	Startup	Stakeholder	Leadership	75
7.9.2022	Society	Stakeholder	Management	72
8.9.2022	Construction	Stakeholder	Management	64
14.9.2022	Society	Provider, Stakeholder	Leadership	61
14.9.2022	Media	owner	Leadership	29
22.9.2022	Technology	Producer	Leadership	68

in Finnish apartment transactions and financing. Tracing the evolution of environmental, organisational and technical developments in this way illustrates the elements that enabled platform scaling and its eventual transition away from blockchain.

**4.1.1. Key findings and outcomes from the case**

Fragmented technological readiness and industry complexities shaped the housing trade platform’s DT and initially hindered coordination. However, proactive industry-led initiatives were crucial in driving digitalisation, particularly in response to regulatory gaps. The platform’s success was underpinned by structured collaboration, clear stakeholder alignment and the establishment of governance structures such as compliance and product development boards. The ecosystem leveraged the complementary strengths of its participants, enabling a more effective transformation process.

A dynamic and ongoing stakeholder dialogue was essential to

**Table 3**  
Timeline for the case study.

Chronological Event	Relation to the TOE Framework	Representative Quote
Initial State (Prior to 2016)	<b>Technological &amp; Organisational</b> – Banks and real estate agents exhibited varied levels of digital maturity and readiness, which impacted on the progress of digitisation. Three banks making up 77 % of the housing loan market invested in the R3 Consortium’s Corda. The real estate agent industry was comprised of around 4000 individual agents and 1500 agencies that generally displayed low digitalisation levels. The Land Survey of Finland implemented a digital RCPIIS in 2016, and the Finnish Tax Officials transitioned to a plug-in tax application in 2013.	‘When the real estate agent field is so scattered, they don’t have a unified forum that would drive digitalisation forward.’ –Industry Representative
Startup as an Initiator (2016–2017)	<b>Technological &amp; Environmental</b> – A startup proactively addressed upcoming regulatory changes and technological opportunities to create a transaction layer linked to the governmental apartment registry. This led to a public-private proof-of-concept (PoC) in May 2017 involving the NLS, tax authorities, and two major banks representing 68.1 % of the housing loan market. The PoC aimed to test the feasibility of a blockchain solution for apartment registration.	‘In 2017, we heard that a law was coming... it started because banks saw enormous benefits in transacting digitally. ... It was originally established from a very technological standpoint, but it began because the banks and the entire industry saw such enormous benefits in transacting digitally.’ –Startup Representative ‘Corda linkage sparked our interest. We were very interested in what blockchain technology could bring. That’s what drove us to collaborate.’ –Industry Representative
Ecosystem Expansion (2018)	<b>Organisational &amp; Environmental</b> – Banks and real estate agents collaborated to manage compliance and competitive dynamics. Two large agent organisations joined this collaboration. The ecosystem of five competing banks and two real estate agencies set collaborative boundaries. Moreover, legal consultants helped with competition issues such as pricing. There was a need for a legal entity to manage network operations and facilitate binding contracts among platform participants; thus, a limited company owned by the startup and four banks was set up in 2018. Due to complex legacy infrastructures, the banks did not integrate the housing trade platform into their IT systems. Instead, they used the platform	‘Highly regulated banks in particular have various compliance and regulatory risk management aspects at the heart of their operations, making product and process approval processes within the banks very important enablers of collaboration.’ –Industry Representative ‘Inviting competing players to the same table, including those from other industries, requires flexibility from both sides. Thus, as the agile software development startup world significantly slows down, the banking world significantly speeds up.’ –Industry Representative

(continued on next page)

Table 3 (continued)

Chronological Event	Relation to the TOE Framework	Representative Quote
Defining the Optimal Housing Transaction Process (2018)	through their user interface. <b>Organisational &amp; Technological</b> – Banks and real estate agents and the technology startup had a shared goal to create a seamless, location-independent experience for end-users. Regulatory changes that abolished paper share certificates mandated a new transaction and mortgaging process. This required alignment among stakeholders. Startups initiated the idea, fostered collaboration and aligned stakeholders. They leveraged expertise in blockchain and legacy banking technology for cost-effective, accelerated ecosystem development. Banks provided critical credibility that was necessary to attract regulatory authority involvement and enhanced information security through rigorous compliance processes. Authorities sought increased digital structural data via the platform and advocated for a unified data model that promoted standardisation across the industry. Collaboration with authorities to clarify regulations in digital contexts moved the proposal forward by allowing, for instance, tax returns to be automatically filed to Finnish tax authorities after a sales contract was signed digitally. A lean implementation approach permitted adjustments based on the delayed schedules of the government’s digitalisation initiative.	<i>‘Understanding platform business, what can be done as a platform and what opportunities an individual actor may attempt to create on top of that was probably a central aspect [of business model alignment]. That was probably the biggest challenge, because there was clearly a suspicious atmosphere at the beginning.’</i> –Industry Representative <i>‘From the platform’s perspective, the fact that each agent system builds its user interface – creates complexity – when developing new things means that we practically must discuss with nine broker systems and 11 banks. So, developing and preparing new things takes a lot of time.’</i> –Startup Representative <i>‘The housing trade platform has created a 24/7 world for real estate transactions. This was not possible before as the traditional way was somehow considered sacred.’</i> –Industry Representative <i>A crucial element [when hiring a new leader for the platform company] was that this person has the facilitating and coordinating ability to keep these stakeholders together and maintain the good cooperation that has been created.’</i> –Industry Representative
Platform Launch Adoption and Trust-Building (Mid-2019)	<b>Organisational &amp; Technological</b> – The platform was launched with an emphasis on real estate agents as keys to adoption. The traditional real estate industry was often resistant towards digitalisation. The platform invested in agent training, guidance, customer support and user-friendly technology to build trust and boost agents’ confidence in digital transactions. The housing trade platform’s incremental development initially	<i>‘Getting real estate brokers involved was crucial (for adoption). There were challenges because there haven’t been many digital traditions in the industry.’</i> –Industry Representative <i>‘In this whole thing, the broker is like a king maker. We have invested in training and guidance so that we would have as little adoption friction as possible.’</i> –Industry Representative <i>‘Fortunately, the adoption happened quite quickly. Two-thirds of the market was covered. That was the</i>

Table 3 (continued)

Chronological Event	Relation to the TOE Framework	Representative Quote
Scaling the Platform, Covid-19 Effects, and Ownership Changes (2020–2021)	relied on manual labour for linked bank processes, causing trust concerns for real estate agents. Although banks set transaction phase targets (e.g., signing within five days), some banks struggled to meet them, decreasing overall trust among real estate agents and end users. Hence, the promised benefit of faster transactions was not realised from the agents’ perspective, possibly due to inadequate bank resourcing during this interim period. <b>Environmental &amp; Organisational</b> – Bank involvement significantly contributed to the platform’s development, while the adoption by real estate agents surged during COVID-19 due to heightened demand for secure digital transactions. After media company acquisition (80.5 % of the housing trade platform for 14.3 M€,) four banks collectively retained 19.5 % ownership of the limited company, while the startup sold its stake. This expanded the platform’s resources but introduced new stakeholder dynamics and monopoly concerns. While the startup’s CEO left after a year, operations continued with the same team under a new chief business officer.	<i>decisive factor – a lot of work was done to ensure that [coverage].’</i> –Industry Representative <i>‘The platform hasn’t fully met the desire for faster transaction processes.’</i> –Industry Representative <i>‘Inviting competing players requires flexibility from both sides.’</i> –Industry Representative <i>‘We reached the point we did precisely because we were dealing with a clever and agile startup. At best, involving a large player can bring more resources and capacity to develop it further...The downside can be that we focus on efficiency and maintaining the existing product for cash flow purposes. Perhaps another thing is that the platform has achieved a powerful position. That is probably not the optimal solution for the market in the long run.’</i> –Industry Representative
Abandoning Corda (2021–2022)	<b>Technological</b> - The platform replaced Corda with centralised technology due to complexity, cost and scalability issues. While each bank was originally envisioned to run its own node, the startup initially facilitated all nodes centrally in a shared cloud environment. Blockchain was initially valuable for the housing trade platform’s development, as it attracted banks with prior investments in the technology. However, the system never progressed to a point in which banks operated their own nodes. In addition, unnecessary overheads were created as the startup attempted to manage multiple nodes centrally. Transaction times were slow and infrastructure costs high due to Corda’s	<i>‘If [the startup] had begun selling this real estate trading system to the banks without blockchain technology perspective, they probably would have never been able to get the banks to participate. They wanted to pilot something around it, and it was the perfect timing for that.’</i> –Authorities Representative <i>‘In practice, those technologies should be transparent. On the other hand, it [technology] shouldn’t matter as long as it’s functional and reliable. But in the long run, it can also impact someone if the trust structures are somehow left in the background.’</i> –Industry Representative <i>‘Blockchain technology was significant at that time. That’s how I interpreted it. It’s good for society too, that it’s a more decentralised system.’</i> –Authorities

(continued on next page)

Table 3 (continued)

Chronological Event	Relation to the TOE Framework	Representative Quote
	licencing fees. Moreover, maintaining Corda required specialised expertise, which formed a scaling bottleneck. The system was redesigned to remove Corda while preserving the existing workflows. Corda or blockchains are no longer used, and the platform was replaced by more conventional, API-driven architecture, thus reducing complexity and improving response times. By the end of 2022, 40 % of apartment transactions conducted via real estate agents utilised the platform.	Representative 'It's [blockchain] probably been one of the reasons why it's succeeded, because it's new technology that provides a solution to things that otherwise would have to be considered at the data-centre level, such as interfaces and security issues that each player must take care of themselves. It's probably been much easier to build a legal framework around it than to impose legal requirements on each participant.' –Industry Representative
Future Considerations (2022 and Beyond)	<b>Environmental &amp; Organisational</b> - Ongoing concerns about platform monopolisation, stakeholder alignment and long-term sustainability persist.	"Will this form into a monopoly?... It's a concern for me." –Authorities Representative

aligning interests and distributing value within the housing trade platform. User training, clear communication and dedicated support services helped overcome adoption barriers and fostered trust among fragmented industry participants. While external investments accelerated growth, they also introduced challenges related to governance, alignment and the risk of monopolisation. Additionally, the technology's practical usability and scalability ultimately proved to be more critical than the initial technology choice, highlighting the need for adaptability and agility in digitalisation efforts.

Blockchain was a critical catalyst in the early stages of the DT process. It attracted key stakeholders – mainly banks – already invested in Corda, fostering early engagement. By enabling distributed trust, blockchain facilitated collaboration by addressing data control and security concerns. The technology also provided innovative interoperability and secure transaction management solutions while simplifying legal and compliance requirements through a decentralised shared

platform. Moreover, the novelty of blockchain encouraged participation across the ecosystem, particularly of banks, further accelerating the momentum of digital transformation.

Continuous stakeholder dialogue and communication, as well as governance flexibility, remain essential for the future management of the complexities in evolving digital ecosystems. The platform's long-term sustainability will depend on its ability to balance innovation, competition and regulatory considerations while maintaining an inclusive and effective digital transaction environment.

Fig. 2 details the growing adoption rates of the housing trade platform among banks and users, including real estate agents, buyers and sellers. The light blue line indicates increased apartment transactions via real estate agents. Bank involvement has significantly contributed to the platform's development, while real estate agents' adoption surged during the COVID-19 pandemic due to the heightened demand for secure digital transactions.

#### 4.2. Best practices for successful collaboration and tackling challenges in cross-industry DT with blockchain

The chronological analysis in Section 4.1 highlight how ecosystem collaboration, technological agility and regulatory engagement were critical to overcoming adoption and scaling barriers. This section distils these findings into six best practices for effective collaboration in cross-industry DT. Each best practice aligns with one or more of the TOE's three dimensions, demonstrating how these factors influence the ecosystem's digital transformation process. Drawing from the analysis in Section 4.1, the TOE framework and the relevant literature on blockchain adoption and digital transformation, this section contextualises the findings within a broader cross-industry perspective.

The idea that DT is an iterative and evolving process that requires flexibility, ongoing adaptation and strategic alignment between stakeholders, is a key insight from the analysis in Section 4.1. This understanding is explicitly reflected in the 'flexibility in technology and agile implementation' best practice, which demonstrates how, over time, incremental development, stakeholder engagement and regulatory adaptability shape the DT process.

##### 4.2.1. Industry-level mindset and shared vision

The industry-level perspective on DT focuses on collective needs and benefits rather than individual company interests, prioritising outcomes that enhance trust and mutual understanding, and strategic alignment among diverse stakeholders. This best practice aligns with the TOE's environmental dimension, as it highlights how external conditions and

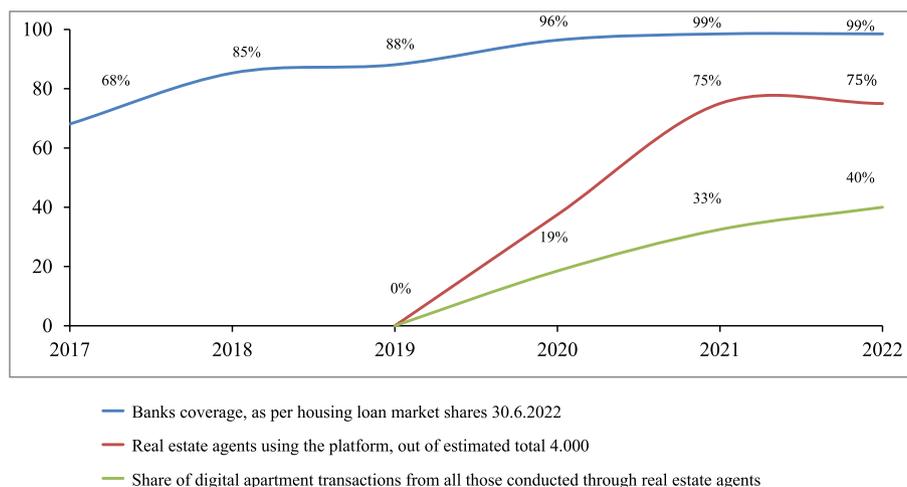


Fig. 2. Adoption rates of banks and real estate agents. The blue line illustrates the share of digital apartment transactions. Figure authors' own. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

multistakeholder engagement influence DT success. Emphasising a shared vision encourages the design of a digital process that enhances the overall user experience, operational efficiency and transparency through smart contracts that affect transactions in an autonomous – yet impartial – manner. This vision should be compelling and inspiring enough to help parties remain committed to the shared objectives while simultaneously providing clear direction and purpose, thus facilitating strategic alignment and effective decision-making. A strong sense of commitment can emerge when stakeholders, including public authorities, incumbents and new entrants, work together on these industry-wide goals, thereby reinforcing the collective endeavour to achieve sustainable DT.

In the empirical case, aligning key industry players – banks, real estate agents, and public authorities – behind a shared vision for digital apartment transactions catalysed the move away from isolated, company-specific interests. Early collaboration sessions encountered initial scepticism and varied digitalisation readiness among stakeholders. The shared vision and creation of a unified digital process aligned the efforts of stakeholders. They fostered a sense of collective ownership and commitment to the DT initiative, illustrating a mindset shift from individual company benefits to broader ecosystem-wide gains.

Understanding the complementary contributions of each ecosystem participant helped overcome initial resistance. Banks provided credibility, compliance expertise, and financial infrastructure, ensuring that transactions adhered to strict regulatory and risk management requirements, whereas real estate agents played a key role in end-user adoption and transaction execution. The technology startup's agility and technical expertise enabled rapid platform development and continuous adaptation. Lastly, public authorities, including the NLS and Tax Administration, played a dual role: they ensured regulatory oversight and legal certainty, which was crucial in securing stakeholder trust, and actively shaped a unified industry framework while promoting standardised digital data practices to facilitate seamless adoption across the ecosystem.

By fostering a collective vision to overcome organisational (e.g. cognitive barriers and resistance) and environmental (e.g. inadequate DT strategy) challenges (Volberda et al., 2021; Warner & Waeger, 2019), this best practice addresses the lack of alliance partners and the strategic misalignment that often hinders DT and blockchain scaling. While Zavolokina et al. (2020) suggest starting blockchain consortiums with non-competing parties to build trust, our case shows that even direct competitors (i.e. banks controlling about 70 % of the Finnish mortgage) can form an industry-level perspective and achieve consensus early on, aided by a neutral startup. This finding extends prior research by suggesting that even when key actors are direct competitors, early consensus-building and 'coopetition'. This has been defined by Lacity and Hoek (2021) and Lacity et al. (2024), as cooperation among traditional competitors in non-competitive areas, benefits all parties, and demonstrates that trust and shared objectives can emerge even in competitive – rather than purely complementary – partnerships, ultimately fostering collective DT progress.

#### 4.2.2. Formalised collaboration and public–private partnerships

Establishing formalised collaboration settings (i.e. regular opportunities for structured dialogue and cooperation) helps to ensure the continuous alignment of stakeholder interests and fair value distribution over time. This best practice reflects TOEs organisational dimensions, as it emphasises the fact that governance structures, decision-making processes, and institutional coordination are required for DT adoption. Robust public–private-people partnerships in which the end-users value proposition is a key priority, and incremental development cycles create environments in which evolving regulations, changing market conditions and emerging technical standards can be interpreted collectively. These collaborative forums facilitate agile responses to new challenges, prevent the fragmentation of initiatives and allow authorities and

private actors to more effectively influence and adapt the DT process. Overall, monitoring and adapting to changes in the environmental context is crucial to scaling DT, which is why an incremental and agile development mode may be helpful and should be considered as part of any implementation plan.

In the empirical case, the initial PoC with the banks and authorities established a practice of open, structured engagement, pooling diverse expertise and resources. This practice was sustained throughout formal collaboration forums and development streams that included public authorities even when they could not maintain their own nodes. The public–private-people partnership (PPP) placed the end-user value proposition at the forefront of the partnership, enabling both parties to transact and finance securely anytime and anywhere. Broad industry coverage helped define a common process to sustain alignment with the shared vision. Moreover, continuous multiparty involvement allowed the development of the platform to stay in sync with authorities' schedules and adapt swiftly to environmental changes, such as the move to remove services during the COVID-19 pandemic.

By establishing structured communication channels that address organisational (e.g. compartmentalised initiatives and a lack of dynamic capabilities) and technological (e.g. a lack of standardisation) complexities, as well as environmental hindrances (e.g. evolving regulations), this best practice facilitates continuous adaptation as being crucial to scaling DT (Butt, 2020; Toufaily et al., 2021). Continuous, formalised collaboration helps address technical integration and lack of standardisation challenge that often plague DT efforts. They can also help in tackling the organisational DT challenges of compartmentalised DT initiatives and the lack of dynamic capabilities while managing conflicting objectives and ensuring ecosystem readiness. Similarly, Shah and Raj (2025) highlight PPPs as a key mechanism for balancing regulatory, technical, and societal priorities in central bank digital currency rollouts. Their conclusion parallels our findings on how structured multi-stakeholder engagement can mitigate legal and technical constraints by ensuring participant goals are addressed.

This also resonates with the work of Zavolokina et al. (2020), who emphasise the use of iterative communication to balance the diverse interests and evolving conditions in blockchain consortia. These insights align closely with the principle of formalised public-private partnerships, where business-led cooperation (Lacity & Hoek, 2021) and strategic engagement with policy-makers (Lacity et al., 2024) form the backbone of collaborative governance structure necessary for scaling blockchain in complex institutional contexts. Our case, however, shows that the direct involvement of authorities and ongoing structural interactions can be even more effective than just educating and advocating policy-makers. By fostering incremental adaptation and focusing on industry-level and broader societal benefits first, this approach resolves tensions and improves readiness for long-term DT goals, thereby aligning with studies finding that sustained dialogue is the key to bridging short-term efficiencies and long-term value creation (Zavolokina et al., 2020).

#### 4.2.3. Governance structure with sustainable business models and funding

Robust governance agreements, including those that form dedicated legal entities such as limited liability companies or cooperatives, clarify roles, responsibilities and ownership structures between platform owners and stakeholders, thereby enhancing trust and transparency in the ecosystem. This best practice aligns with the organisational and environmental dimensions of TOE, as it addresses governance structures, decision-making processes and financial sustainability, ultimately ensuring stable long-term DT. The early engagement of key market players in governance structures generates network effects. Solid business models that capture value transparently and efficiently are essential for generating sufficient revenue to support ongoing operations and developments, despite the industry platform's aims to serve the entire industry. Securing continued financing throughout the scaling process is critical for success, particularly when the initial enthusiasm wanes. On-

chain governance provides token holders with the (decentralised) right to vote on and implement changes in a blockchain. Off-chain governance involves changes controlled by a select group of individuals, reflecting a centralised governance model. Hence, understanding the importance of off-chain governance in blockchain platforms is vital for blockchain-driven DT processes. If the platform ownership is centralised, so is the decision-making power – despite the decentralised blockchain.

In the empirical case, forming a dedicated legal entity initially co-owned by banks and a startup ensured formal agreements between the platform and stakeholders, thus legitimising the platform's business model based on transaction fees. The early involvement of major banks secured broad market coverage, accelerating adoption and the delivery of network effects. Reflecting on these agreements, one interviewee suggested that a cooperative structure could sustain an industry-level balance of power and thus mitigate concerns over future centralisation or monopolisation.

By introducing clear governance and sustainable business models, this best practice addresses several organisational (e.g. business model alignment or the lack of alliance partners) and environmental (e.g. inadequate DT strategies) challenges. Moreover, this best practice mitigates technological complexities (e.g., integration barriers) by ensuring stable financing and long-term viability. This aligns with the recommendations of [Lacity et al. \(2024\)](#) and the [World Economic Forum, 2024](#) on governance arrangements for trading partners. Both [Lacity and Hoek \(2021\)](#) and [Lacity et al. \(2024\)](#) note that blockchain solutions are often 'backstories' to complex governance and value negotiations. Our emphasis on robust governance structures, cooperative frameworks and early market coverage reinforces these insights.

Sustainable business models and continuous financing are essential for scaling DT, as shown by the failures of B2B blockchain consortia such as TradeLens, We.Trade, Marco Polo and Contour, which demonstrated that without profitable scaling, stable funding and durable stakeholder commitment, even well-backed initiatives can collapse ([Bousquette, 2022](#); [Digital Finance Media Limited, 2024](#); [Patel, 2023](#); [Wragg, 2023](#)). In line with [Upadhyay \(2024\)](#) who identifies revenue streams and cost efficiency among the top three key elements in blockchain business models, our findings likewise confirm that carefully configured funding mechanisms (such as adopting a transaction-fee-based revenue model) are crucial for achieving sustained adoption in cross-industry contexts. Furthermore, by highlighting the distinction between blockchain network governance, application-level governance and the governance of companies controlling the applications, our best practice recommendation also contributes to the DT literature.

Our findings align with the recommendations offered by [Laatikainen et al. \(2021\)](#), which emphasise the importance of a clear distinction between several governance levels: network governance, application-level governance and company-level governance. Striking a balance between on-chain automation and off-chain collaboration is essential for ensuring alignment with broader system goals and addressing dynamic challenges as systems evolve. Governance frameworks must also incorporate legal, regulatory and business considerations, to ensure that ownership models, such as cooperatives or LLCs, align incentives across network and application levels.

#### 4.2.4. Complementary ecosystem roles and early-stage champions

Ecosystems that draw on diverse skill sets and expertise are more resilient and better positioned for success. This involves recognising and harnessing the unique strengths that each stakeholder brings to the platform, creating a synergistic environment in which combined efforts greater overall outcomes than those resulting from individual contributions. The presence of an early-stage champion, typically a leader with a strong vision and the ability to coordinate diverse stakeholders, anchors these initiatives forward. Over time, ensuring that capabilities diffuse throughout the ecosystem, rather than remaining tied to a single individual, helps maintain stability and adaptability as the DT process progresses. This best practice reflects both the organisational and

environmental TOE dimensions, highlighting how ecosystem actors contribute complementary expertise and how early-stage champions help align diverse interests to drive DT adoption.

The empirical case study demonstrates how distinct capabilities – technical expertise from a startup; credibility, compliance rigour and extensive customer reach from banks; regulatory insights and societal benefits from authorities; and, later, financial and marketing strength from a media company – combined to strengthen the ecosystem. The startup CEO played a crucial early champion role in this case, coordinating these diverse actors and ensuring that the platform remained focused on its shared vision. The balanced mix of capabilities and resources and clear leadership strengthened the platform's overall resilience, enabling it to evolve and rapidly gain industry trust.

By pooling diverse expertise and providing a central coordinating role, this best practice addresses organisational challenges (e.g. trust dependency and a lack of digital skills) and helps navigate the complex workflows and readiness issues that arise when scaling blockchain-DT solutions ([Chirumalla, 2021](#); [Gupta, 2018](#)). This aligns with the work of [Lacity and Hoek \(2021\)](#), who find that business-led efforts flourish when participants pool their strengths and build trust through neutral facilitators. While [Lacity et al. \(2024\)](#) focus on building, buying or renting technical provisioning capabilities, our case shows that in an ecosystem, traditional enterprises can also – at least to some extent – rely on the technical expertise of the other ecosystem members. Overall, our best practice complements their emphasis on moving from asking 'What's in it for me?' to asking 'What's in it for us?' by ensuring that expertise and leadership are shared resources, fostering a stronger, more resilient ecosystem. Although [Zavolokina et al. \(2020\)](#) suggest involving non-competing actors first, our case study, which began with competing stakeholders, demonstrates that a strong, neutral champion can harmonise interests and guide the consortium towards collaborative value creation.

#### 4.2.5. Stakeholder training and support

Support mechanisms and training programs tailored to critical key stakeholders encourage trust and resistance to new digital solutions. Instructional materials, user-friendly interfaces and continuous customer assistance enhance confidence in the platform's reliability and ease of use. As stakeholders become more comfortable with the new processes, adoption accelerates and scepticism can diminish, which allows the ecosystem to evolve beyond traditional practices towards more efficient and transparent digital transactions. As with any platform business, aiming for high network effects is critical for success. This best practice is tied to the organisational and technological TOE dimensions, as it focuses on building stakeholder readiness, reducing adoption barriers and ensuring smooth platform implementation through structured learning processes.

Real estate agents in the empirical case acted as key gatekeepers whose acceptance could determine the platform's success. Targeted training, user-friendly interfaces and responsive customer support addressed agents' initial scepticism and limited digitalisation. By enhancing agents' confidence and smoothing the transition to digital transactions, the platform paved the way for broader adoption and stronger network effects.

By enhancing skills, reducing cognitive barriers and addressing scepticism, this best practice tackles organisational readiness issues and cultural inertia, thereby improving the conditions needed for scaling blockchain-driven DT initiatives ([Favoretto et al., 2022](#); [Volberda et al., 2021](#); [Zavolokina et al., 2020](#)). [Lacity and Hoek \(2021\)](#) indicate that first-generation blockchain solutions often require onboarding and educating less tech-savvy participants to realise network-wide benefits, while [Lacity et al. \(2024\)](#) claim that educating policy makers and establishing higher-level standards leads to more fruitful outcomes. Our approach, which adopts end-user-focused training, complements these viewpoints by reducing scepticism and building the confidence necessary for broader adoption. As [Zavolokina et al. \(2020\)](#) highlight,

uncertainties and regulatory complexity can deter participation. By offering tailored support to key stakeholders, such as real estate agents, we address practical adoption barriers, enhance trust in the new digital processes and facilitate steady ecosystem growth.

#### 4.2.6. Flexibility in technology and agile implementation

An agile and iterative approach to technology implementation allows for responsive adaptations to changing regulations, user feedback, and market conditions. This aligns with the TOE's technological and environmental dimensions and demonstrates how adaptable systems enable sustained transformation. Lean processes facilitate early value delivery, even if its initial steps involve bridging manual and digital components. Over time, gradual improvements refine these solutions, integrate them with existing systems and build towards more complex industry-level functionalities. Rather than requiring immediate overhauls, this evolving approach promotes sustainable and lasting DT aligned with stakeholder expectations and ecosystem maturity. This can also help control development costs, align with authorities' schedules and help reduce risk by allowing for adjustments based on real-time feedback.

Throughout the empirical case's DT process (Section 4.1), flexibility in technology and agile implementation enabled the platform to adapt to different phases, allowing for incremental improvements, regulatory alignment and the evolution of collaboration structures. The step-by-step evolution of the platform, which began with partially manual processes and eventually incorporated more sophisticated digital workflows and end-user interfaces, allowed the ecosystem to accommodate delays, regulatory updates and technical hurdles. While blockchain initially attracted key stakeholders and built credibility, the platform later seamlessly moved away from Corda without disrupting the user experience. This adaptive, incremental rollout ensured continuous value delivery and responsiveness to environmental changes throughout the transformation journey.

By iteratively refining solutions and adapting to environmental changes (e.g., market volatility) while addressing organisational inertia and technological immaturity, these best practices ensure that blockchain-DT efforts can evolve sustainably and accommodate shifting market conditions (Hanelt et al., 2021; Liu et al., 2021; Zavolokina et al., 2020). Lacity and Hoek (2021) emphasise the importance of incremental evolution in the DT process, while Zavolokina et al. (2020) note that managing paradoxical tensions, such as short-term efficiency gains versus long-term transformation, is essential in blockchain consortia. This iterative and incremental approach mirrors the chronological evolution described in Section 4.1, in which continuous adaptation at each phase of DT enables platform scaling and, eventually, its transition beyond blockchain. This analysis also illustrates how iterative refinement and responsiveness to real-time feedback can align short-term operational goals with the long-term DT vision.

The case study incidates that practical usability and scalability often trumped initial technology choices, underscoring the importance of agility and adaptability in technology adoption. Continuous stakeholder dialogue and governance flexibility are necessary to manage evolving digital ecosystem problem solving, complexities and sustainability.

Fig. 3 below illustrates the best practices for scaling industry-level, blockchain-driven DT across an entire ecosystem of stakeholders and for tackling challenges through efficient collaboration. Collectively, these best practices describe how the TOE framework helps explain DT in multistakeholder environments, demonstrating the interplay between technological adaptability, organisational governance and environmental conditions.

## 5. Discussion & conclusions

### 5.1. Summary of key contributions

This study is among the first real-world case studies to explore how

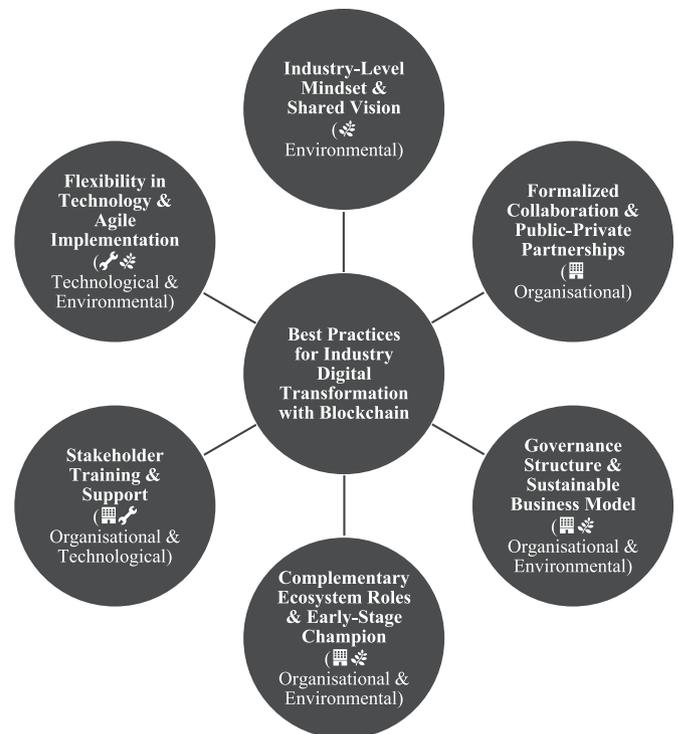


Fig. 3. Best practices for industry-level DT with blockchain.

cross-industry DT can succeed in using blockchain technology to address both adoption and scaling challenges. It provides key contributions to the current understanding of the success factors of blockchain-driven DT in cross-industry settings.

First, this study introduces an industry-level perspective on DT that prioritises collective ecosystem needs over individual company interests. Unlike most existing research focusing on firm-level DT – emphasising internal strategies, cultures and capabilities (Van Veldhoven & Vanthienen, 2023) – this study shifts the perspective to an entire ecosystem of stakeholders and highlights the importance of a cross-industry mindset and collaboration as a foundation for successful blockchain-driven DT.

Second, unlike previous studies suggesting that blockchain adoption should begin with noncompeting partners to build trust (Zavolokina et al., 2020), our findings reveal that a shared vision can emerge even among direct competitors. This challenges the assumption that cooperative cooptation is impossible to establish early on, demonstrating instead that trust and shared objectives can materialise even within competitive environments.

Third, this study highlights the crucial role of neutral early-stage champions in facilitating industry-level alignment among competitors. Our case study demonstrates that a strong, neutral champion can guide even competitors towards shared goals, ensuring that expertise and responsibilities are distributed within the ecosystem and that complementary ecosystem capabilities are mobilised.

Fourth, this study validates the effectiveness of an agile, incremental approach to technology development in scaling DT. Our findings highlight how this adaptable approach to technology adoption is novel and supports DT scalability in practice, thereby reinforcing its effectiveness as a long-term strategy. The study demonstrates how early-stage value delivery, regulatory engagement, and iterative platform development enable blockchain-based DT to scale without disrupting existing operations.

## 5.2. Theoretical contributions

Our study is among the first longitudinal investigations to empirically follow blockchain-based digital transformation (BC-DT) throughout its lifecycle; thus, it offers new theoretical insights. First, our results highlight that the factors influencing the adoption and use of new technology are highly dynamic. Technology adoption should be understood as cyclical – rather than a linear – process with continuous adaptation and use cycles emphasising different technology, organisation and environment (TOE) factors competing against each other. This was evident in our study, in which technological factors (i.e., blockchain technology) initially dominated but were later overtaken by environmental and organisational factors, leading to the replacement of the original technology with a comparative new one in the value creation process.

Second, our findings align with studies emphasising ecosystems over individual organisations (Toufaily et al., 2021) within the TOE framework. In our study, no dominant organisation was identified; instead, value creation within the ecosystem was found to be the primary driver for technology adoption, whereas value appropriation by individual organisations was only a secondary driver for innovation.

This study shifts the focus from policy advocacy to regulatory participation in DT initiatives, thereby highlighting the value of formalised collaboration settings and public–private partnerships in ensuring the continuous alignment of stakeholder interests, regulatory compliance and adaptability to environmental changes. While the prior literature has emphasised the need for industry to advocate for policy changes (Lacity et al., 2024), but our findings reveal that the effectiveness of directly involving public authorities in the development process – rather than post-hoc regulation – can align industry stakeholders and policymakers. This suggests that policy alignment should be an integral part of the DT process from the outset rather than be treated as an external constraint.

We emphasise the critical role of a robust and reliable governance structure and viable business models in sustaining operations and scaling blockchain-driven DT initiatives. Our findings introduce a multilayer governance model for blockchain-driven DT that distinguishes among network governance, application-level governance and company-level governance. While prior research has acknowledged governance as a key challenge for successful blockchain applications (Lacity & Hoek, 2021), it often fails to address the distinct roles of these governance layers in enabling decentralised coordination, regulatory responsiveness and sustainable ecosystem development. This study demonstrates that clearly defined governance layers can mitigate centralisation risks, prevent financial instability and enhance long-term platform viability. Furthermore, it finds that robust multilayer governance structures and viable business models help avoid risks of centralisation, ensure accountability and prevent the failed refinancing rounds often seen in B2B blockchain consortiums.

### 5.2.1. Practical implications

The six best practices identified in this study offer direct and practical guidance for companies implementing blockchain-driven DT. This section highlights key novel aspects of this study that are relevant to practitioners and policymakers.

Ensuring business model viability and governance alignment throughout the evolving DT process is crucial for practitioners. A clear governance structure mitigates centralisation risks, ensures financial sustainability beyond pilot faces and enables industry-wide adoption. Practitioners should engage public authorities when DT initiatives intersect with public service efficiencies, such as automated tax filings, to create mutual incentives for collaboration. This study highlights the importance of formalised collaboration settings and public–private partnerships in ensuring continuous stakeholder alignment, regulatory compliance and adaptability to environmental changes. In addition, it reinforces the value of training key stakeholders as part of a market

entry strategy, thereby ensuring smoother adoption and minimising resistance.

For policymakers, DT regulation should be proactive and co-evolve with DT initiatives, rather than just react after implementation. If DT benefits public services, regulators should actively engage, experiment and even invest in early-stage pilots to gain firsthand insights into the technology pursued before shaping policy. Encouraging public–private collaboration from the outset – rather than reacting after implementation – ensures that policy aligns with technological advancements while fostering innovation.

Ultimately, both companies and regulators benefit from early cooperation. Companies should proactively invite authorities into DT initiatives to prevent regulatory bottlenecks, while policymakers should identify where DT aligns with public-sector goals to drive mutually beneficial innovation.

## 5.3. Limitations and further research

Insights from the current study are drawn from a single case example from Finland – a small, highly digitalised and high-trust environment that may not fully capture the complexity of cross-border, large-scale DT initiatives. Although the best practices identified in this study were informed by the literature on both DT successes and failures, relying on a single successful case study limits the findings' generalisability. Moreover, some best practices, such as those related to public–private collaboration, may be specific to cross-industry collaboration, which can be interlinked with governmental service efficiency. Future research in diverse industries, larger markets and cross-border settings is needed to test the presented best practices and explore longer timeframes with which to observe evolving capabilities and regulatory changes.

With the shift towards public blockchains and hybrid models, future research should move beyond retrospective analysis and focus on action-oriented or design research to assist enterprises in the implementation of the newest decentralised innovations in their DT efforts. Specifically, studies could explore how AI, zero-knowledge proofs and Layer-2 scaling solutions can be integrated into real-world enterprise applications to address ongoing scalability, automation and governance challenges. Finally, investigating how cross-ecosystem interoperability and industry-wide data standards at the national and global levels will influence long-term blockchain sustainability and offer valuable guidance for scaling blockchain-driven DT.

### CRedit authorship contribution statement

**Annina Saari:** Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Sarah Sinclair:** Writing – original draft, Conceptualization. **Rebecca Leshinsky:** Writing – review & editing, Conceptualization. **Seppo Junnila:** Writing – review & editing, Supervision, Conceptualization.

### Declaration of generative AI and AI-assisted technologies in the writing process

The authors used ChatGPT 4o and Grammarly AI during the preparation of this work to translate Finnish interview quotes into English and to improve language and readability. The authors reviewed and edited the content as needed after the tools/services were used and take full responsibility for the content of the publication.

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**Declaration of competing interest**

interests or personal relationships that could have appeared to influence the work reported in this paper.

The authors declare that they have no known competing financial

**Appendix A. Phase Two Interview Protocol**

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Background

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Role in the organisation? Experience with the platform? When have you joined the ecosystem?

**A1. Open round**  
 What is the value of the platform? What benefits has the platform provided?  
 What challenges have you noted with the platform? When have the challenges occurred?

**A2. Theory-based round: Challenges and value**  
 What challenges have you noticed and when? Any of the following? How was the challenge solved?

Technological	Organisational	Environmental
Immature technology		
Security	Governance and leadership readiness	Regulatory uncertainty
Data privacy	Business model alignment	Network effects and inter-organisational connectedness
Cost of technology	Organisational readiness	Ecosystem readiness
Interoperability	Awareness/lack of participants	Off-chain verification processes
Complexity		

Which of the following values has the platform provided? (according to interviewee's role):

<b>Organisations and industries</b>	End-users and Society
Industry leadership	Transparency
Expectations of ROI	Transaction speed
Coordination	Data and ID control
Business process improvements	Social and financial inclusion
Improving customer experience	Empowerment
Data security	New jobs opportunities
Developing new capabilities	Economic Growth
Coordination	
<b>Public sector</b>	Startups and Entrepreneurs
Coordination and horizontal integration of data	New business opportunities
Industry creation	New business models
Public services efficiency	Funding
International leadership	Data protection and privacy
Championship of innovation	
Expectations of ROI	
Business process improvements	

**A3. Radical changes in technological, organisational, and environmental contexts**  
 Have you experienced radical changes in the ecosystem's technological, organisational, or environmental contexts? Their effects??  
 An organisation purchased most platform company's shares on 30th Dec 2020. How has this affected value and challenges of the platform and ecosystem?  
 The platform is not using blockchain anymore. How does this change affect the platform's and ecosystem's value and challenges?  
 What has been blockchain meaning in the platform and the development of the ecosystem?

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**Appendix B. Code folders, with examples of code groups, codes and quotations**

This appendix presents the coding structure, including code folders, with some examples of code groups, codes, and quotations. The codes were derived using thematic content analysis, and structured based on the TOE framework. The identified best practices were also structured into a code folder.

Code Folders	Code Groups, examples	Code, example	Quotation, example
Technological dimensions	Technological immaturity	Recruiting challenges	"For example, recruiting Corda developers has been challenging and more costly."
	Corda removal Genuine business case fit	Covert Orchestrating a shared process	"I know they changed it, but it was done outside of the shared roadmap." "With traditional technology, the process would have stalled due to silos. Corda solves the problem of tracking process status across organisations by encoding process logic and defining each party's inputs and outputs."
Organisational dimensions	Business mindset change	Industry-level perspective	"Another value is that this sector hasn't traditionally had much collaboration. Now we've been able to establish a common way of operating and bring market participants to the same table to develop industry-wide practices."
	New majority owner	Increased resources	"With them as the new owner, they now have an even greater need to develop the system. They likely also have more financial resources to invest in its development, alongside their other evolving systems."
Environmental dimensions	Covid effects	Increased adoption	"The pandemic was a huge world-wide shock that most likely increased the platform adoption as it allowed remote housing trade."

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Code Folders	Code Groups, examples	Code, example	Quotation, example
	Complexity	Industry-related	"We are building this system on top of the old one. We have legacy structures in both processes and technical systems, meaning that even the way we work is based on an existing framework. Naturally, this impacts how things are done today."
	Regulations	Translating existing regulations in digital settings	"Current legislation is based on an analog process, which has forced to interpret how the legislation should be interpreted in digital operating models"
Best practices	Industry-level mindset and shared vision	Mutual aim	"Fundamentally, all parties stand behind this. Everyone probably sees the shared benefits."
	Formalised collaboration and public-private partnerships	Defining roles	"The key was creating a shared understanding of everyone's role and clearly defining boundaries. After all, no one wants to enter into a collaboration where they gain only a little while their competitor benefits disproportionately."
	Governance structure with sustainable business model and funding	Stakeholder forums	"like I mentioned earlier about stakeholder or collaboration forums—they been just as important as the technology itself. Having all stakeholders involved in the development of the platform from the very beginning has been crucial."
	Complementary ecosystem roles and early-stage champion	Startup CEO's role	"He's role should not be underestimated – he has been a real driving force in this, making things happen across different organisations very efficiently. Having a clear leader has been instrumental in ensuring that decisions were made quickly."
	Stakeholder training and support	Customer support and training for agents	"I think the system, overall, works really well, and we've received excellent instructions in every way, and support during implementation. It has gone very smoothly"
	Flexibility in technology adoption and agile implementation	Step-by-step approach	"One important decision that was made was to implement a temporary process: instead of waiting for governmental share registry to be completed, a process was created using digital powers of attorney, based on the existing paper-based share certificates. The signing is done digitally, and from the customer's perspective, everything is handled digitally, but in the back office, the physical share certificates are still being transferred from one bank to another. "

## Data availability

The data that has been used is confidential.

## References

- Akella, G. K., Wibowo, S., Grandhi, S., & Mubarak, S. (2023). A systematic review of Blockchain technology adoption barriers and enablers for smart and sustainable agriculture. In *Vol. 7. Big Data and Cognitive Computing* (p. 86). Multidisciplinary Digital Publishing Institute. <https://doi.org/10.3390/bdcc7020086>.
- Aliu, J., Oke, A. E., & Ehosun, L. U. (2024). Distributed ledger technology integration in Nigerian construction industry: Key drivers. *International Journal of Building Pathology and Adaptation*. <https://doi.org/10.1108/IJBPA-02-2024-0044>
- Alkathiri, H., & Ahmad, S. Z. (2024). Examining blockchain adoption determinants and supply chain performance: An empirical study in the logistics and supply chain management industry. *Journal of Modelling in Management*. <https://doi.org/10.1108/JM2-08-2023-0186>
- AlShamsi, M., Al-Emran, M., & Shaalan, K. (2022). A systematic review on Blockchain adoption. *Applied Sciences*, 12(9), 4245. <https://doi.org/10.3390/app12094245>
- Alstynne, M. W. V., Parker, G. G., & Choudary, S. P. (2016). *Pipelines, platforms, and the new rules of strategy*. Harvard Business Review, 54–60. 62. Retrieved from <https://hbr.org/2016/04/pipelines-platforms-and-the-new-rules-of-strategy>.
- Bag, S., Rahman, M. S., Gupta, S., & Wood, L. C. (2022). Understanding and predicting the determinants of blockchain technology adoption and SMEs' performance. *The International Journal of Logistics Management*, 34(6), 1781–1807. <https://doi.org/10.1108/IJLM-01-2022-0017>
- Bousquette, I. (2022). Blockchain fails to gain traction in the Enterprise. *Wall Street Journal*. Retrieved from <https://www.wsj.com/articles/blockchain-fails-to-gain-traction-in-the-enterprise-11671057528> Accessed September 11, 2024.
- Butt, J. (2020). A conceptual framework to support digital transformation in manufacturing using an integrated business process management approach. *Designs*, 4(3), 17. <https://doi.org/10.3390/designs4030017>
- Casati, M., Soregaroli, C., Frizzi, G. L., & Stranieri, S. (2024). Impacts of blockchain technology in agrifood: Exploring the interplay between transactions and firms' strategic resources. *Supply Chain Management: An International Journal*, 29(7), 51–70. <https://doi.org/10.1108/SCM-09-2023-0443>
- Catalini, C., & Gans, J. S. (2016). *Some simple economics of the Blockchain, no. 22952, the national bureau of economic research* (p. 40).
- Chirumalla, K. (2021). Building digitally-enabled process innovation in the process industries: A dynamic capabilities approach. *Technovation*, 105, Article 102256. <https://doi.org/10.1016/j.technovation.2021.102256>
- Chittipaka, V., Kumar, S., Sivarajah, U., Bowden, J. L.-H., & Baral, M. M. (2023). Blockchain Technology for Supply Chains operating in emerging markets: An empirical examination of technology-organization-environment (TOE) framework. *Annals of Operations Research*, 327(1), 465–492. <https://doi.org/10.1007/s10479-022-04801-5>
- Clohesy, T., & Acton, T. (2019). Investigating the influence of organizational factors on blockchain adoption: An innovation theory perspective. *Industrial Management & Data Systems*, 119(7), 1457–1491. <https://doi.org/10.1108/IMDS-08-2018-0365>
- Clohesy, T., Treiblmaier, H., Acton, T., & Rogers, N. (2020). Antecedents of blockchain adoption: An integrative framework. *Strategic Change*, 29(5), 501–515. <https://doi.org/10.1002/jsc.2360>
- Davidson, S., De Filippi, P., & Potts, J. (2018). Blockchains and the economic institutions of capitalism. *Journal of Institutional Economics*, 14(4), 639–658. <https://doi.org/10.1017/S1744137417000200>
- Digital Finance Media Limited. (2024). *Digitizing Trade Finance in the Post-Contour World*. Digital Finance. Retrieved from <https://www.digfingroup.com/contour-trade-finance/> Accessed December 2, 2024.
- Favoretto, C., Mendes, G. H. S., Oliveira, M. G., Cauchick-Miguel, P. A., & Coreynen, W. (2022). From servitization to digital servitization: How digitalization transforms companies' transition towards services. *Industrial Marketing Management*, 102, 104–121. <https://doi.org/10.1016/j.indmarman.2022.01.003>
- Fitch. (2025). *Fitch Affirms Finland at 'AA+'; Outlook Negative, Rating Action Commentary*. Retrieved from <https://www.fitchratings.com/research/sovereigns/fitch-affirms-finland-at-aa-outlook-negative-07-02-2025> Accessed March 19, 2025.
- Friese, S. (2019). *Qualitative Data Analysis With ATLAS.Ti* (3rd ed.). Los Angeles: SAGE.
- Ganguly, K. K. (2024). Understanding the challenges of the adoption of blockchain technology in the logistics sector: The TOE framework. *Technology Analysis & Strategic Management*, 36(3), 457–471. <https://doi.org/10.1080/09537325.2022.2036333>
- Gökalp, E., Gökalp, M. O., & Çoban, S. (2022). Blockchain-based supply chain management: Understanding the determinants of adoption in the context of organizations. *Information Systems Management*, 39(2), 100–121. <https://doi.org/10.1080/10580530.2020.1812014>
- Gökalp, E., & Martinez, V. (2021). Digital transformation capability maturity model enabling the assessment of industrial manufacturers. *Computers in Industry*, 132, Article 103522. <https://doi.org/10.1016/j.compind.2021.103522>
- Gong, C., & Ribiere, V. (2021). Developing a unified definition of digital transformation. *Technovation*, 102, Article 102217. <https://doi.org/10.1016/j.technovation.2020.102217>
- Gupta, S. (2018). *Organizational Barriers to Digital Transformation*. Stockholm: KTH Royal Institute of Technology.
- Hadi Almaher, M. A., Thiruchelvan, S. A. L., Isa, B. M., & A.A.. (2024). A conceptual model for blockchain adoption intentions: A T-O-E framework perspective. *Journal of Infrastructure, Policy and Development*, 8(6), 4685. <https://doi.org/10.24294/jipd.v8i6.4685>
- Hanelt, A., Bohnsack, R., Marz, D., & Antunes Marante, C. (2021). A systematic review of the literature on digital transformation: Insights and implications for strategy and organizational change. *Journal of Management Studies*, 58(5), 1159–1197. <https://doi.org/10.1111/joms.12639>
- Hubanova, T., Lindeque, J. P., & Peter, M. (2024). Explaining the non-adoption of blockchain technology in global value chains: a micro-foundational perspective. *Journal of Industrial and Business Economics*, 51. <https://doi.org/10.1007/s40812-023-00296-8>

- Ishfaq, R., Davis-Sramek, B., & Gibson, B. (2022). Digital supply chains in omnichannel retail: A conceptual framework. *Journal of Business Logistics*, 43(2), 169–188. <https://doi.org/10.1111/jbl.12277>
- Jabbar, S., Lloyd, H., Hammoudeh, M., Adebisi, B., & Raza, U. (2021). Blockchain-enabled supply chain: Analysis, challenges, and future directions. *Multimedia Systems*, 27(4), 787–806. <https://doi.org/10.1007/s00530-020-00687-0>
- Kajla, T., Sood, K., Gupta, S., Raj, S., & Singh, H. (2023). Identification and prioritization of the factors influencing blockchain adoption in the banking sector: Integrating fuzzy AHP with TOE framework. *International Journal of Quality & Reliability Management*, 41(8), 2004–2026. <https://doi.org/10.1108/IJQRM-03-2023-0079>
- Kouhizadeh, M., Saberi, S., & Sarkis, J. (2021). Blockchain technology and the sustainable supply chain: Theoretically exploring adoption barriers. *International Journal of Production Economics*, 231, Article 107831. <https://doi.org/10.1016/j.ijpe.2020.107831>
- Laatikainen, G., Li, M., & Abrahamsson, P. (2021). Blockchain governance: A dynamic view. In X. Wang, A. Martini, A. Nguyen-Duc, & V. Stray (Eds.), *Software Business* (pp. 66–80). Cham: Springer International Publishing. [https://doi.org/10.1007/978-3-030-91983-2\\_6](https://doi.org/10.1007/978-3-030-91983-2_6).
- Lacity, M., & Hoek, R. V. (2021). What We've learned so far about Blockchain for business. *MIT Sloan Management Review*, 62 No. 3.
- Lacity, M., O'Leary, D. E., & Conway, D. (2024). Developing capabilities for B2B commerce on public decentralized networks. *MIS Quarterly*, 23.
- Legesse, A., Beshah, B., Berhan, E., & Tesfaye, E. (2024). Exploring the influencing factors of blockchain technology adoption in national quality infrastructure: A dual-stage structural equation model and artificial neural network approach using TAM-TOE framework. *Cogent Engineering*, 11(1), Article 2369220. <https://doi.org/10.1080/23311916.2024.2369220>
- Leocádio, D., Malheiro, L., & dos Reis, J. C. G. (2024). Auditors in the digital age: A systematic literature review. *Digital Transformation and Society*. <https://doi.org/10.1108/DTS-02-2024-0014>
- Liu, Y., Ni, Z., Karlsson, M., & Gong, S. (2021). Methodology for digital transformation with internet of things and cloud computing: A practical guideline for innovation in small- and medium-sized enterprises. *Sensors*, 21(16), 5355. <https://doi.org/10.3390/s21165355>
- Malik, S., Chadhar, M., Vatanasakdakul, S., & Chetty, M. (2021). Factors affecting the organizational adoption of blockchain technology: Extending the technology–organization–environment (TOE) framework in the Australian context. *Sustainability*, 13(16), 9404. <https://doi.org/10.3390/su13169404>
- Mbadlisa, G., & Jokonya, O. (2024). Factors affecting the adoption of blockchain technologies in the food supply chain. *Frontiers in Sustainable Food Systems*, 8. <https://doi.org/10.3389/fsufs.2024.1497599>
- Nakamoto, S. (2008). *Bitcoin: A Peer-to-Peer Electronic Cash System*. Whitepaper. Retrieved.
- Patel, D. (2023). *Marco polo network runs insolvent with €5.2m debts*. Trade Finance Global. Retrieved from <https://www.tradefinanceglobal.com/posts/marco-polo-network-runs-insolvent/> Accessed December 12, 2024.
- Pólvora, A., Nascimento, S., Lourenço, J. S., & Scapolo, F. (2020). Blockchain for industrial transformations: A forward-looking approach with multi-stakeholder engagement for policy advice. *Technological Forecasting and Social Change*, 157, Article 120091. <https://doi.org/10.1016/j.techfore.2020.120091>
- Saari, A., Junnila, S., & Vimpri, J. (2024). Blockchain-driven digital transformation in the housing industry. *Digital Transformation and Society*. <https://doi.org/10.1108/DTS-06-2024-0088>
- Sedlmeir, J., Lautenschlager, J., Fridgen, G., & Urbach, N. (2022). The transparency challenge of blockchain in organizations. *Electronic Markets*, 32(3), 1779–1794. <https://doi.org/10.1007/s12525-022-00536-0>
- Shah, M. A., & Raj, N. (2025). Examining the role of blockchain and public-private partnerships in design and deployment of blockchain-enabled CBDC. *Digital Business*, 5(1), Article 100111. <https://doi.org/10.1016/j.digbus.2025.100111>
- Topcu, Y. E., Can, İ. E., & Özçınar, A. (2023). Blockchain technology in foreign trade management: Which blockchain alternative is more suitable? *Digital Policy, Regulation and Governance*, 26(2), 121–134. <https://doi.org/10.1108/DPRG-05-2023-0064>
- Tornatzky, L., & Fleischer, M. (1990). *The process of technology innovation*. Lexington, MA: Lexington Books.
- Toufaily, E., Zalan, T., & Dhaou, S. B. (2021). A framework of blockchain technology adoption: An investigation of challenges and expected value. *Information & Management*, 58(3), Article 103444. <https://doi.org/10.1016/j.im.2021.103444>
- Upadhyay, N. (2024). Business models for the Blockchain: An empirical analysis. *Digital Business*, 4(2), Article 100082. <https://doi.org/10.1016/j.digbus.2024.100082>
- Van Veldhoven, Z., & Vanthienen, J. (2023). The role of trade associations in the digital transformation of their industry. *Digital Transformation and Society*, 2(3), 235–256. <https://doi.org/10.1108/DTS-11-2022-0058>
- Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *The Journal of Strategic Information Systems*, 28(2), 118–144. <https://doi.org/10.1016/j.jsis.2019.01.003>
- Volberda, H. W., Khanagha, S., Baden-Fuller, C., Mihalache, O. R., & Birkinshaw, J. (2021). Strategizing in a digital world: Overcoming cognitive barriers, reconfiguring routines and introducing new organizational forms. *Long Range Planning*, 54. <https://doi.org/10.1016/j.lrp.2021.102110>
- Warner, K. S. R., & Waeger, M. (2019). Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. *Long Range Planning*, 52(3), 326–349. <https://doi.org/10.1016/j.lrp.2018.12.001>
- Wragg, E. (2023, September 25). *Kanexa Rises From Marco Polo's Ashes With Pivot to Open Account Automation*. Global Trade Review. Retrieved from <https://www.gtrview.com/news/fintech/kanexa-rises-from-marco-polos-ashes-with-pivot-to-open-account-automation/>. Accessed December 2, 2024.
- World Economic Forum. (2024). *WEF Blockchain Toolkit, Legal and Regulatory Compliance*. Retrieved from <https://widgets.weforum.org/blockchain-toolkit/legal-and-regulatory-compliance/index.html>? Accessed December 17, 2024.
- Wu, H., Zhong, W., Zhong, B., Li, H., Guo, J., & Mehmood, I. (2023). Barrier identification, analysis and solutions of blockchain adoption in construction: A fuzzy DEMATEL and TOE integrated method. *Engineering Construction and Architectural Management*, 32(1), 409–426. <https://doi.org/10.1108/ECAM-02-2023-0168>
- Yin, R. K. (1994). *Case Study Research: Design and Methods* (2nd ed.). Los Angeles: SAGE Publications.
- Zavolokina, L., Ziolkowski, R., & Bauer, I. (2020). Management, governance, and value creation in a Blockchain consortium. *MIS Quarterly Executive*, 19(1), 1–17. <https://doi.org/10.17705/2msqe.00022>
- Zhang, Y., Tavalaei, M. M., Parry, G., & Zhou, P. (2024). Evolution or involution? A systematic literature review of organisations' blockchain adoption factors. *Technological Forecasting and Social Change*, 208, Article 123710. <https://doi.org/10.1016/j.techfore.2024.123710>