ACTA SCIENTIARUM POLONORUM Acta Sci. Pol., Administratio Locorum 25(3) 2026, 635–652.
https://czasopisma.uwm.edu.pl/index.php/aspal plISSN 1644-0749 eISSN 2450-0771 DOI: 10.31648/aspal.12647

ORIGINAL PAPER
Received: 16.04.2026 Accepted: 19.06.2026

SOCIAL SERVICES REVITALISATION: THE ROLE OF BLOCKCHAIN TECHNOLOGY, MULTI-LEVEL GOVERNANCE, AND COMMUNITY-BASED PROTECTION IN COMPARATIVE PERSPECTIVE

Aneta Tylman[1]✉, Marcin Podgorski[2]✉

[1] ORCID: 0000-0003-2008-6115
[2] ORCID: 0000-0003-2054-194X
[1,2] Uniwersytet Lodzki
prez. Gabriela Narutowicza Street, 68, 90-136 Łódź, **Poland**

ABSTRACT

This article examines the potential of blockchain technology to support the revitalisation of social services delivered by local government units by improving transparency, accountability, coordination, and trust in digital local administration. It asks how the integration of blockchain with multi-level governance and community-based protection may affect the efficiency, transparency, and inclusiveness of local social services. The study adopts a conceptual and exploratory design based on desk research, legal and institutional analysis, comparative assessment, and illustrative public-sector examples. It argues that, under specific institutional and legal conditions, the European Union model may offer advantages for social services because it combines regulatory coordination, interoperability, subsidiarity, data protection, and safeguards for citizens' rights. The article proposes an integrated analytical framework and a four-phase implementation model for local government units, while emphasising that blockchain should be treated as a selective and conditional instrument rather than a universal solution.

Keywords: blockchain, revitalisation of social services, local government units, multi-level governance, community-based protection, smart territorial governance

INTRODUCTION

This study addresses the following research problem: under what institutional, legal, and social conditions can blockchain technology contribute to the revitalisation of social services delivered by local government units? This question is important because local governments are increasingly expected to deliver transparent, coordinated, and accessible social services while operating under financial, organisational, and technological constraints. It is also theoretically interesting because blockchain is often analysed either as a financial innovation or as a technical infrastructure, whereas its potential in local public services depends on its embedding in governance structures and community relations. The article approaches this problem through a conceptual, analytical, and exploratory design, combining literature review, legal and institutional analysis, comparative assessment of governance models, and illustrative case studies.

✉aneta.tylman@uni.lodz.pl, ✉marcin.podgorski@uni.lodz.pl

© Copyright by Wydawnictwo Uniwersytetu Warmińsko-Mazurskiego w Olsztynie

The issue is also relevant to the thematic profile of local and regional development. Social services are part of local social infrastructure: they shape access to welfare, housing support, care, employment activation, and community resilience within a specific territorial setting. For this reason, the digitalisation of social services should be analysed not only as an administrative matter, but also as an element of smart city governance, digital local administration, territorial development, and the management of local social infrastructure. Blockchain is therefore considered here as a possible component of territorially embedded public-service governance rather than as a purely technical or financial innovation.

LITERATURE REVIEW

Digital technologies are reshaping public administration, including the organisation and delivery of social services. Local government units (LGUs), as the entities directly responsible for organising and delivering these services, face the challenge of revitalising them under conditions of growing social expectations and constrained financial, human, and organisational resources (Hausner, 2019). In this article, the revitalisation of social services is understood not in the conventional sense of spatial intervention, but rather as a process of institutional and organisational modernisation. This process includes the introduction of new technological solutions, the enhancement of efficiency, and the adaptation of service delivery to changing social needs.

One important direction of such revitalisation is the use of distributed ledger technologies, including blockchain. In this article, blockchain is understood broadly as an element of digital infrastructure that enables secure, verifiable, and transparent data recording, as well as the automation of selected administrative processes. In the literature, blockchain is increasingly seen as a trust infrastructure that supports the development of systems that are more resistant to abuse and more effective in the management of public resources (Tapscott & Tapscott, 2016; Werbach, 2018). At the same time, its application in the public sector, especially in social services, remains largely at the pilot, experimental, or conceptual stage (Finck, 2019; World Bank, 2017).

For the purpose of assessing the potential of blockchain technology and identifying the conditions for its effective implementation, the European Union's model of multi-level governance is of particular importance. This model assumes interaction among different levels of authority – European, national, and local – as well as the participation of non-institutional actors such as civil society organisations and local communities (Bache & Flinders, 2004; Hooghe & Marks, 2001). In the field of social services, such an approach may improve coordination, increase the effectiveness of public policies, and allow solutions to be adapted more flexibly to diverse social needs. Against this background, the EU model is compared here with the regulatory and institutional arrangements operating in the United States, China, and selected other countries.

Despite the growing interest in the use of blockchain technology in public administration, its potential in the operational sphere of social services remains underexplored. In particular, there is a shortage of analyses that combine a technological perspective with the community-based protection approach developed in international practice (UNHCR, 2013), which this article identifies as a significant research gap.

Although recent blockchain-related research has advanced primarily in the field of digital assets and cryptocurrencies, these studies remain only indirectly relevant to local public-service delivery (Dimitriadis et al., 2024; Dimitriadis et al., 2025a; Dimitriadis et al., 2025b). This literature demonstrates that blockchain-related assets have already become an important object of advanced empirical inquiry. However, these studies focus primarily on financial markets and asset dynamics rather than on blockchain as an institutional infrastructure for public-service delivery. The present article therefore differs from existing research by shifting the analytical focus from digital assets as market instruments to distributed ledger technologies as potential governance tools in local social services. Its novelty lies in combining three

✉aneta.tylman@uni.lodz.pl, ✉marcin.podgorski@uni.lodz.pl

perspectives that are usually considered separately: blockchain-based trust infrastructure, multi-level governance, and community-based protection.

More recent public-sector studies also support a more cautious and empirically grounded framing. Wamba et al. (2024), analysing 167 blockchain-driven public-sector projects, show that blockchain may improve selected government functions such as public-service governance, administrative efficiency, open-government capability, process innovation, and operational performance, but only under particular organisational and technological configurations. Benchis et al. (2025), using interviews within a technology-organisation-environment framework, emphasise that public-sector adoption is shaped by regulatory concerns, legacy systems, institutional leadership, training, and the need to avoid interruption of public services. In the smart-city literature, Biasin and Delle Foglie (2024) show that blockchain is increasingly discussed in relation to inclusive and sustainable urban communities, while also pointing to a shortage of studies on practical urban applications. These findings strengthen the rationale for analysing blockchain through local governance, territorial development, and social-infrastructure management rather than through financial-market applications alone.

In this study, community-based protection is treated as an adapted analytical framework for interpreting the role of local communities in the design, co-creation, and monitoring of social services, rather than as a literal transfer of an operational model from humanitarian policy. This interpretative move makes it possible to capture the communal and participatory dimension of social services while preserving the specificity of public administration and the local-government context in which such services are delivered.

The issue addressed here is situated within the broader body of research on regional development, in which the quality of local institutions, the capacity for cooperation, the accessibility of public services, and the ability to implement organisational and technological innovation are all of central importance (Hausner, 2019; OECD, 2019). Integrating a technological perspective with a community-oriented one may lead to new models of social service delivery based on cooperation across levels of administration, greater transparency and accountability in public processes, and stronger agency among beneficiaries and local communities.

The aim of the article is to assess the potential of blockchain technology in the revitalisation of social services and to identify the conditions for its effective implementation in the context of multi-level governance and the community-based protection approach. The article therefore treats blockchain not as a universal remedy for social-service problems, but as a selective institutional technology whose usefulness depends on the need for auditable records, multi-actor coordination, entitlement verification, and trusted data exchange.

The review combined foundational theoretical works on multi-level governance, public administration, and collective action with recent studies and legal documents published mainly between 2017 and 2026. Earlier works were included where they provided core conceptual foundations, while recent sources were prioritised for the analysis of blockchain, digital identity, interoperability, and public-sector implementation.

RESEARCH PROBLEM, QUESTIONS AND ANALYTICAL PROPOSITIONS

This article argues that blockchain technology may support the revitalisation of social services delivered by local government units by enhancing transparency, interoperability, and public trust. At the same time, the effectiveness of such applications depends on their integration with multi-level governance and the community-based protection approach.

This central proposition is elaborated through four subsidiary claims. First, the European model – grounded in multi-level governance, regulatory harmonisation, and systems interoperability – appears more conducive to the use of blockchain in public services than models dominated either by market logic or by centralised decision-making. Second, local government units appear to play a key role in adapting

✉aneta.tylman@uni.lodz.pl, ✉marcin.podgorski@uni.lodz.pl

and operationalising such solutions at the local level. Third, the integration of blockchain technology with the community-based protection approach may enhance the inclusiveness, transparency, and efficiency of social services. Fourth, implementation effectiveness appears to be constrained by institutional, technological, and social barriers whose mitigation requires coordinated action across different levels of governance.

On the basis of these propositions, the article formulates the following overarching research question: how may the integration of blockchain technology with multi-level governance and the community-based protection approach influence the efficiency, transparency, and inclusiveness of social services at the local level? To operationalise this overarching question, four more specific research questions are posed. First, how does the structure of multi-level governance shape the conditions for the implementation of blockchain in public administration? Second, which implementation models are most suitable for social services delivered by local government units? Third, to what extent may the integration of blockchain technology with the community-based protection approach improve participation, coordination, and service efficiency? Fourth, what legal, institutional, technological, and social barriers constrain its local implementation, and what mechanisms derived from the logic of multi-level governance may help address them?

To reduce the risk of normative interpretation, the article uses the key concepts in an analytical rather than a statistically measurable sense. Because the study is conceptual and exploratory, these categories are not operationalised as quantitative indicators; instead, they function as assessment dimensions used to compare governance models, evaluate implementation conditions, and structure the phased implementation model. The operational meaning of the main concepts is summarised in Table 1.

MATERIALS AND METHODS

The study is conceptual, analytical, and exploratory in nature. This follows both from the relatively early stage of development of blockchain applications in the social-services sector and from the limited availability of empirical data in this field. The aim is therefore not to provide a statistical verification of the propositions advanced, but rather to offer an analytical assessment of the potential of this technology in the revitalisation of social services and to identify the conditions for its implementation within a framework of multi-level governance. In this sense, the propositions serve an ordering and interpretative function, structuring both the analysis and the line of reasoning.

Table 1. Analytical framework and indicators used to assess blockchain-supported social service revitalisation

Concept	Operational meaning in this article	Analytical indicators used in the assessment
Efficiency	The ability of a social-service system to reduce duplication, delays, fraud risk, and administrative fragmentation.	Traceability of entitlements; reduction of repeated verification; coordination among institutions; administrative process simplification.
Transparency	The extent to which allocation, verification, and settlement of benefits or services can be audited by authorised actors.	Auditable logs; verifiable records; accountability of transactions; clarity of responsibility.
Inclusiveness	The capacity of the system to remain accessible to vulnerable users and to include beneficiaries and community actors in design or monitoring.	Accessibility safeguards; digital-exclusion mitigation; participation of beneficiaries; civil-society involvement.
Revitalisation of social services	Institutional and organisational modernisation of local social infrastructure, not spatial revitalisation in a narrow planning sense.	New coordination mechanisms; integration of digital infrastructure; adaptation to local needs; stronger local institutional capacity.

Source: Author's own elaboration.

✉aneta.tylman@uni.lodz.pl, ✉marcin.podgorski@uni.lodz.pl

The article adopts a qualitative, exploratory, and explanatory approach that makes it possible to capture the complexity of the phenomenon under study and to integrate technological, institutional, and social perspectives. The chosen research perspective is consistent both with the assumptions of multi-level governance, which emphasise the coexistence and interaction of different regulatory and executive levels, and with the community-based protection approach, which highlights the importance of local actors and social relations in the provision of public services.

The primary research method is desk research, encompassing a review of academic literature, European Union strategic documents, legal acts, and reports of international organisations concerning the use of distributed ledger technologies in the public sector. Sources were selected according to three criteria: relevance to blockchain applications in public administration and social services; relevance to multi-level governance, interoperability, digital identity, and data protection; and institutional authority or scholarly quality. Priority was given to peer-reviewed academic publications, EU legal and strategic documents, reports by international organisations, and well-documented public-sector blockchain initiatives. Because direct empirical evidence on blockchain in social services remains limited, examples were included only where they concerned adjacent administrative functions, such as entitlement verification, public registries, digital identity, document authentication, or inter-institutional data exchange. This review is supplemented by elements of comparative analysis relating to regulatory and institutional models operating in the European Union, the United States, China, and selected other countries. Such an approach makes it possible to identify systemic differences and to assess their significance for the implementation of blockchain technology in public services.

The analytical procedure consisted of four steps. First, the literature and institutional documents were reviewed in order to identify dominant application areas, barriers, and governance models for blockchain in the public sector. Second, the EU, US, Chinese, and pragmatic implementation models were compared according to criteria derived from the requirements of local social services: regulatory coherence, interoperability, protection of sensitive data, local adaptability, and participation. Third, empirical examples from public administration and local governance were used as illustrative evidence of possible mechanisms, rather than as proof of causal impact in social services. Fourth, the implementation model was derived by matching the identified barriers with feasible institutional responses available to local government units.

Triangulation was conducted at the level of sources and analytical perspectives. The study combines: (1) scholarly literature on blockchain, public administration, multi-level governance, and smart-city governance; (2) EU legal and strategic documents concerning digital identity, interoperability, data protection, and digital infrastructure; (3) international and institutional reports on public-sector blockchain applications; and (4) illustrative examples of blockchain projects in public administration and local governance. This triangulation does not replace empirical fieldwork; rather, it reduces reliance on a single type of source and allows the proposed framework to be assessed against technological, legal, institutional, and territorial dimensions.

The empirical examples considered in the article serve an illustrative and heuristic function. They include public-administration and local-governance applications such as blockchain-supported digital identity and document verification, public registries, smart-city and e-government projects, and broader public-sector blockchain transformations identified in recent empirical studies. These examples are used to identify mechanisms and boundary conditions that may be transferred cautiously to social services, not to claim direct statistical evidence for welfare outcomes.

Consequently, the case material is not treated as direct empirical proof that blockchain has already improved the efficiency of social services. Rather, it is used to identify plausible mechanisms, implementation conditions, and risks. Where evidence concerns areas adjacent to social services, such as digital identity, document verification, public registries, or

✉aneta.tylman@uni.lodz.pl, ✉marcin.podgorski@uni.lodz.pl

administrative entitlements, the article draws cautious inferences instead of making strong causal claims.

The logic of case selection is therefore theoretical and illustrative: the selected examples concern public-sector functions that are adjacent to social services because they involve entitlement verification, public registries, inter-institutional data exchange, local administration, or smart territorial governance. Table 2 summarises the role of these examples in the article.

A further element of the study is conceptual analysis aimed at identifying and systematising models for the use of blockchain technology in social services, particularly with regard to voucher-based solutions, the tokenisation of services, participatory tools, and the community-based protection approach. This analysis is embedded within the broader framework of multi-level governance, which makes it possible to relate technological solutions to their institutional and regulatory conditions.

A key limitation of the study is the absence of a broad empirical database on the use of blockchain technology in social services, reflecting the pilot nature of many existing implementations and their institutional diversity. Nevertheless, the adopted methodology makes it possible to identify major trends, assess the potential of the solutions analysed, and formulate conclusions and recommendations concerning the role of local government units in their implementation.

RESULTS

EU Multi-Level Governance and comparative blockchain regulatory models

The European Union's policy on blockchain forms part of the broader project of building a digital single market and developing modern public services based on trust, interoperability, and data sovereignty. One of the key initiatives in this area is the European Blockchain Services Infrastructure (EBSI), developed since 2018 by the European Commission and the Member States within the framework of the European Blockchain Partnership (European Commission, 2026a). Its purpose is to create a shared digital infrastructure based on distributed ledger technology.

EBSI provides an example of transnational digital infrastructure that is not a social-service system itself, but may be relevant to social services insofar as these services increasingly depend on digital identity,

Table 2. Illustrative and heuristic evidence base for the assessment of blockchain applications relevant to social servic

Example or evidence base	Public-administration function	Relevance for social services	Status in the article
EBSI and European digital-identity/document-verification initiatives	Cross-border verification of identity, qualifications, and public documents	Shows how interoperable trust infrastructure may support entitlement verification and administrative coordination	Illustrative EU institutional example
Georgia land-registry blockchain initiatives and Smart Dubai strategy	Public registries, administrative records, smart-government services	Demonstrates the suitability of DLT for records that require traceability and auditability	Illustrative public-administration examples
Benchis et al. (2025) interviews on public/private blockchain adoption	Technology, organisation, and environment conditions for adoption	Highlights regulatory concerns, legacy systems, leadership, training, and institutional capacity	Secondary empirical evidence
Smart-city literature on blockchain and inclusive sustainable communities	Urban governance, local infrastructure, territorial development	Connects blockchain to smart city governance and the management of local infrastructure	Contextual territorial evidence

Source: Author's own elaboration.

✉aneta.tylman@uni.lodz.pl, ✉marcin.podgorski@uni.lodz.pl

document verification, entitlement confirmation, and secure inter-institutional data exchange (European Commission, 2026b). Its development suggests that, within the European Union, distributed ledger technologies are viewed not only as tools associated with the market for digital assets, but also as components of a trust infrastructure for public administration (Finck, 2019).

Since 2024, an important step towards the further institutionalisation and scaling of EBSI has been the establishment of EUROPEUM-EDIC (European Digital Infrastructure Consortium) (European Commission, 2024), a new EU legal instrument that enables Member States to jointly create, manage, and finance digital-infrastructure projects. This development marks a transition from an experimental phase to a more structured model of infrastructure development, even though many applications remain in pilot or phased-deployment form.

The significance of this direction is reinforced by the evolving regulatory framework, including MiCA – the Markets in Crypto-Assets Regulation (Regulation (EU) 2023/1114, 2023) – which aims to harmonise the rules governing the crypto-asset market in the European Union by introducing requirements for token issuers and digital-service providers. It is also reinforced by the reform of the electronic-identification framework commonly referred to as eIDAS 2.0, introduced through Regulation (EU) 2024/1183 amending Regulation (EU) No 910/2014, which provides, inter alia, for a European Digital Identity Wallet enabling secure identity verification and data management across the Union.

The European regulatory and institutional model is rooted in the concept of multi-level governance, which assumes the coexistence and interaction of multiple levels of decision-making – supranational, national, regional, and local – and the participation of non-state actors in political processes (Hooghe & Marks, 2001). In theoretical terms, this model has been developed most notably by Hooghe and Marks, who argue that European integration entails a durable dispersion of competences across different levels of authority, accompanied by increasingly blurred boundaries between them (Hooghe & Marks, 2001).

The legal foundations of this model in the European Union derive primarily from the principle of conferral, the principle of subsidiarity, and the principle of proportionality, enshrined in Article 5 of the Treaty on European Union (TEU) and in Articles 4–6 of the Treaty on the Functioning of the European Union (TFEU) (Treaty on European Union, 2012; Treaty on the Functioning of the European Union, 2012). The principle of subsidiarity requires decisions to be taken as closely as possible to citizens, while Union-level intervention is justified only where the objectives of a given action cannot be sufficiently achieved by the Member States (Craig & de Burca, 2020). The principle of proportionality, in turn, limits Union action to what is necessary to attain the objectives of the Treaties (Craig & de Burca, 2020).

In practice, this means that technological solutions such as blockchain infrastructure are designed and coordinated at the EU level, implemented at the national level, and then operationalised at the regional and local levels, including by local government units (Bache & Flinders, 2004). Soft-governance mechanisms such as guidelines, interoperability standards, and funding programmes – especially the Digital Europe Programme (European Commission, 2021a) – also play an important role.

Blockchain technology can serve as an infrastructure that integrates these levels by ensuring system interoperability, transparency of information flows, and the automation of selected administrative processes (Tapscott & Tapscott, 2016). In this perspective, blockchain is not merely a technological tool, but also a component of a new model of public governance based on cooperation, dispersed competences, and a greater role for users of public services (Werbach, 2018).

Against the background of the EU's multi-level governance model, approaches to blockchain technology in other parts of the world are shaped by different institutional, regulatory, and cultural conditions.

✉aneta.tylman@uni.lodz.pl, ✉marcin.podgorski@uni.lodz.pl

In the United States, the development of this technology is decentralised but, above all, market-driven. Regulation is dispersed across federal agencies such as the SEC and CFTC and across state-level authorities, which results in a fragmented regulatory environment (SEC, 2019). This model supports high levels of innovation and rapid private-sector development, but is less conducive to the creation of coherent, nationwide solutions for the public sector, including social services (CFTC, 2017).

The Chinese model represents a centralised and state-directed approach. Blockchain technology has been incorporated into the country's strategic-development agenda and integrated into national digital infrastructure, including systems of identification and surveillance (Chen, 2021). These solutions primarily serve to increase administrative efficiency, enhance data security, and strengthen control over information flows (Cyberspace Administration of China, 2019).

By contrast, countries such as the United Arab Emirates, Singapore, and Georgia represent a pragmatic, implementation-oriented model focused on the rapid use of blockchain technology in specific areas of public administration (Smart Dubai, 2016; World Bank, 2017). In these cases, institutional capacity and decisional efficiency are of particular importance.

From a comparative perspective, three basic models can be distinguished: market-based (United States), state-centred (China), and coordinative (European Union). The EU approach appears distinctive in its attempt to reconcile digital innovation with a high level of protection of individual rights, particularly in the areas of personal data and particularly in the areas of personal data and digital security (Regulation (EU) 2016/679, 2016; Regulation (EU) 2023/1114, 2023; Regulation (EU) No 910/2014, 2014).

To assess the relevance of blockchain technology for local social services, the comparison should move beyond broad typologies and focus on the regulatory, institutional, interoperability, and data-protection conditions that shape public-sector implementation. This is particularly important in social services, where digital systems must combine administrative efficiency with legal certainty, accountability, protection of sensitive data, and accessibility for vulnerable users. Table 3 compares the main regulatory and institutional conditions shaping blockchain implementation across the EU, US, Chinese, and pragmatic public-sector models.

In contrast to the market-driven architecture of the United States and the coordinative frameworks of the European Union, the model adopted by the Chinese state exhibits deep structural integration between distributed ledger technologies (DLT) and national digital infrastructure. From a public-sector perspective, this model can be interpreted as being

Table 3. Comparison of regulatory and institutional models of blockchain technology

Criterion	European Union	United States	China (PRC)	Other Countries (UAE, Singapore, Georgia)
Management Model	Multi-level, institutionally diversified governance framework	Decentralised, market-driven reactive federal-state dualism	Hierarchically centralised, integrated national IT architecture	Pragmatic, executive-led centralised alignment
Regulatory Structure	Harmonised cross-border standards (MiCA, eIDAS 2.0)	Fragmented, precedent-based sectoral oversight (SEC, CFTC)	Uniform, based on ex-ante certification and node registration	Focused, specialised regulatory sandboxes
Primary Technocratic Purpose	Public service interoperability and citizen data sovereignty	Market innovation, capital commercialisation, and asset tokenisation	Administrative process optimisation and state governance standardisation	Administrative efficiency and rapid transaction execution
Approach to Data	Rights-based, data minimisation, and strict retention limits (GDPR)	Commercial-oriented, proprietary data flows and corporate custody	Sovereign data management and state-vetted security categorisation	Pragmatic data sharing and public-private optimisation

Source: Author's own elaboration.

✉aneta.tylman@uni.lodz.pl, ✉marcin.podgorski@uni.lodz.pl

based on preventive regulatory codification rather than merely administrative supervision. The foundational legal instrument in this regard is the Blockchain Information Service Management Regulations (区块链信息服务管理规定), promulgated by the Cyberspace Administration of China (CAC) in 2019. This regulatory framework requires DLT providers to apply real-name identity verification against state databases, register their underlying algorithms, and maintain technical capabilities for immediate data mitigation or erasure. Consequently, this replaces absolute data immutability with controlled, redactable permissioned ledger systems.

The Chinese model represents a centralised and state-directed approach. Blockchain technology has been incorporated into the country's strategic-development agenda and integrated into broader national digital-infrastructure initiatives. From the perspective of social-service revitalisation, this model illustrates how distributed ledger technologies may be embedded in centrally coordinated public infrastructure. Such an architecture may increase implementation speed and technical standardisation, but it also subordinates DLT parameters to the logic of state data sovereignty and centralised governance.

To determine how these macro-level arrangements affect localised service delivery, Table 4 provides a sector-specific assessment tailored to the unique requirements of vulnerable service beneficiaries and municipal welfare structures.

As demonstrated by this comparative matrix, the sector-specific advantage of the European Union framework does not lie in operational speed or technical simplicity, but in its capacity to reconcile digital innovation with fundamental rights. While the Chinese state-centric paradigm maximises process efficiency and transaction throughput via centralised infrastructure, it minimises autonomous civic participation. Conversely, the EU model – embedded in the principle of subsidiarity and supported by emerging infrastructures like EUROPEUM--EDIC – seeks to safeguard citizen agency through Self-Sovereign Identity (SSI) frameworks. For local government units managing complex social infrastructure, where transparency, data privacy, and the engagement of civil-society organisations are paramount, this multi-level coordinative framework provides a more resilient, legitimate, and safe ecosystem for vulnerable users.

Table 4. Sector-specific assessment of governance models for blockchain-based social services

Assessment Criterion	EU Multi-Level Model	US Market-Based Model	Chinese State-Centred Model	Relevance for Social Services
Regulatory Coherence	High, driven by binding supranational standards and EBSI frameworks	Limited by fragmented federal mandates and state-level variations	High, determined by top-down five-year plans and CAC guidelines	Necessary for predictable implementation and legal stability in welfare distribution
Interoperability	Structural, operationalised via eIDAS 2.0 and regional frameworks	Fragmented, dependent on private vendors and localised systems	Technical and mandatory, enforced via unified national BSN architecture	Essential for inter-institutional coordination among welfare, health, and labour actors
Protection of Sensitive Data	Strict rights-based orientation under GDPR privacy-by-design rules	Variable, market-oriented, and subject to corporate privacy policies	Subordinated to national security priorities and centralised identity verification	Critical because local social services process highly sensitive data regarding vulnerable users
Local Adaptation & Participation	Supported by the principle of subsidiarity and community-based co-governance	High but unevenly distributed across municipal jurisdictions	Structurally constrained by centralised system architecture	Important for establishing public trust, accessibility, and local institutional legitimacy

Source: Author's own elaboration.

✉aneta.tylman@uni.lodz.pl, ✉marcin.podgorski@uni.lodz.pl

The role of local government units in the multi-level implementation of blockchain technology in social services

Social services constitute a particularly important field for the application of blockchain technology because of their complexity, the multiplicity of actors involved, and their direct impact on the life situation of individuals. Their provision entails not only the transfer of resources, but also the coordination of activities, the management of information, and the protection of sensitive data.

From a territorial perspective, these services are embedded in local social infrastructure and in the everyday functioning of municipalities, counties, urban districts, and regional support networks. Their digital transformation is therefore related to the broader agenda of smart local administration: the integration of data, services, and participatory mechanisms in a way that improves the management of territorially organised public resources. This connection is important because blockchain applications in social services affect not only internal administrative workflows but also the organisation of local service ecosystems and access to public infrastructure.

In this context, blockchain should be understood not merely as a technical tool, but as an element of institutional infrastructure that can support coordination among different levels of governance and among the actors involved in systems of social support (Werbach, 2018; World Bank, 2017). Of particular importance in this respect is its capacity to ensure data integrity, transparency of flows, and accountability of action.

From the perspective of multi-level governance, the implementation of these solutions is systemic in character, encompassing design at the supranational level, regulation at the national level, and implementation at the local level (Hooghe & Marks, 2001).

Among the principal models for the application of blockchain technology in social services, three may be distinguished:

1. First, voucher-based models use digital entitlements assigned to beneficiaries, thereby increasing the transparency of spending and reducing the risk of fraud (Swan, 2015).
2. Second, tokenisation-based care-service models refer to the possibility of recording and settling care-related activities carried out by different entities. This model fits the logic of community-based protection by enabling the development of decentralised support systems (Ostrom, 1990).
3. Third, participatory governance models involve the use of blockchain-supported tools in co-decision and co-governance processes, thereby increasing transparency, accountability, and trust in public procedures (OECD, 2020b).

The community-based protection approach allows for a deeper analysis of the role of blockchain technology by shifting emphasis from a hierarchical model to a network-based one grounded in the cooperation of multiple actors (UNHCR, 2013). When combined with blockchain technology, this approach acquires an institutional dimension: blockchain may function as an infrastructure of coordination and trust that enables collaboration among dispersed entities (Werbach, 2018).

The integration of community-based protection with multi-level governance leads to the emergence of a hybrid model that increases the flexibility and social legitimacy of public services (Bache & Flinders, 2004; Swan, 2015).

Local government units play a key role in the implementation of blockchain technology in the social-services sector because they represent the level of administration closest to the citizen. It is precisely at the local level that direct interaction occurs between public institutions and service users, which makes local government a natural environment for the implementation and adaptation of digital innovation.

From the perspective of multi-level governance, local government units function as the link between the strategic level – European and national – and the operational level at which specific public services are delivered (Hooghe & Marks, 2001). Their role therefore extends beyond the mere implementation

✉aneta.tylman@uni.lodz.pl, ✉marcin.podgorski@uni.lodz.pl

of technological solutions: it also includes adapting those solutions to local social and institutional conditions, which makes them key actors in the operationalisation of public policies.

In this perspective, the significance of local government units can be expressed in four complementary dimensions:

First, as providers of social services, local governments are responsible for designing and delivering public support. In this respect, blockchain technologies may increase transparency in the distribution of benefits, reduce fraud, and improve the efficiency of resource management (Finck, 2019).

Second, LGUs act as integrators of data and systems, combining information from different institutions and sectors. In a multi-actor environment, blockchain enables the creation of interoperable mechanisms for data exchange, which supports coordination and enhances the effectiveness of social services (Werbach, 2018).

Third, local government constitutes the organisational space within which local social ecosystems are formed. Here, the community-based protection approach is especially relevant, as it presupposes the active involvement of the local community in identifying needs, co-creating solutions, and sharing responsibility for the support system (UNHCR, 2013). Integrating this approach with blockchain technology makes it possible to develop co-governance models in which public administration functions as one element within a broader network of actors.

Fourth, local governments may serve as laboratories of public innovation, testing blockchain solutions in a phased and adaptive manner in line with the logic of multi-level governance and with the recommendations of EU institutions concerning the implementation of digital technologies (European Commission, 2020). At the same time, this technology can strengthen public trust by increasing the transparency, auditability, and accountability of administrative action (Tapscott & Tapscott, 2016).

From an implementation perspective, a phased approach and the role of local governments as actors linking the regulatory level with local social needs are of central importance (Treaty on European Union, 2012; Treaty on the Functioning of the European Union, 2012). In this perspective, blockchain technology does not replace existing institutional structures; rather, it complements them by reinforcing mechanisms of coordination and cooperation. Its greatest potential emerges in models that combine multi-level governance with the community-based protection approach (Betts & Collier, 2017).

Implementation barriers and institutional conditions

The implementation model proposed in the following part of the article follows directly from the comparative analysis of regulatory and institutional models. It takes into account both the strengths and the limitations of the approaches discussed above, especially the EU model of multi-level governance, thereby allowing adaptation to the specific conditions under which local government units operate.

Despite the significant potential of blockchain technology, its implementation in local government units faces major legal, technological, institutional, and social barriers.

The key legal barriers include challenges related to the protection of personal data, the absence of clear regulations governing the use of distributed ledger technology in public administration, and the need to ensure that new solutions remain compatible with the existing legal order (Finck, 2019; Regulation (EU) 2016/679, 2016). At the technological level, important issues include interoperability with existing IT infrastructure, limitations of scalability, and system security (World Bank, 2017). It should also be emphasised that blockchain is not a universal solution and that its use is not justified in every case. In particular, it may prove unsuitable for low-complexity services that do not require data sharing among multiple entities, or in cases where the costs of implementation and maintenance outweigh the potential benefits. Its use may also be of limited value where rapid modification of data or central control

✉aneta.tylman@uni.lodz.pl, ✉marcin.podgorski@uni.lodz.pl

over the system is crucial. In this sense, blockchain may sit uneasily with those segments of social services that require a high degree of flexibility, discretionary decision-making, and the individual tailoring of support to the beneficiary's changing circumstances.

The decision not to use blockchain should be based on explicit criteria. Blockchain is inappropriate where a service involves a single trusted administrator, does not require inter-institutional verification, processes highly sensitive data that must be frequently modified, depends on discretionary and rapidly changing individual assessments, or where the expected benefits of auditability and coordination are lower than the costs of deployment, maintenance, training, and accessibility safeguards. It is also inappropriate where less complex technologies, such as secure databases, electronic document management systems, or standard API-based interoperability, can achieve the same public value with lower risk.

A particularly important legal issue is the tension between blockchain immutability and GDPR requirements concerning data rectification, erasure, and purpose limitation. This tension does not necessarily exclude the use of blockchain in social services, but it requires privacy-by-design architecture. In practice, sensitive personal data should not be stored directly on-chain. Blockchain should primarily record hashes, proofs of entitlement, timestamps, access logs, or verification events, while the underlying personal data should remain in controlled off-chain systems where it can be corrected, restricted, or deleted. Permissioned ledgers, data minimisation, role-based access, short retention periods for off-chain data, and clear allocation of controller and processor responsibilities are therefore indispensable conditions for lawful implementation.

Institutional and organisational barriers include limited digital competences within local administration, shortages of financial and human resources, and resistance to change arising from entrenched administrative procedures (OECD, 2019). In this context, the implementation of blockchain technology requires not only the introduction of new tools, but also the transformation of decision-making processes and the organisational culture of the public sector (Dunleavy et al., 2006).

Social barriers are equally important, including the risk of deepening digital exclusion, especially among vulnerable groups such as older persons and persons with disabilities (European Commission, 2022; OECD, 2020a). For this reason, the implementation of blockchain technology cannot be assessed solely in terms of administrative efficiency; it must also take account of inclusiveness, accessibility, and the availability of non-digital or assisted access channels (OECD, 2020b).

A balanced assessment also requires attention to implementation failures and scaling problems. Public-sector blockchain projects may remain at the pilot stage if they are not integrated with legacy systems, if governance responsibilities are unclear, if users do not trust automated procedures, or if the technology creates additional administrative burdens. Scalability may be constrained by transaction costs, latency, cybersecurity requirements, and the need to maintain permissioned access for authorised institutions. Interoperability limitations are particularly important in social services, where welfare, health, education, labour-market, and non-governmental actors often use different data standards and information systems.

From the perspective of multi-level governance, the fragmentation of technological solutions and the lack of uniform interoperability standards also remain serious challenges. Insufficient coordination among the EU, national, and local levels may produce incompatible systems, thereby limiting economies of scale and opportunities for data integration (Hooghe & Marks, 2001). The development of common interoperability frameworks and coordination mechanisms is therefore essential for ensuring coherent technological implementation across different parts of the public-administration system (European Commission, 2017).

Incorporating the perspective of community-based protection further highlights the importance of local communities as co-participants in the implementation process. This approach assumes that the effectiveness of technological solutions depends not only on their

✉aneta.tylman@uni.lodz.pl, ✉marcin.podgorski@uni.lodz.pl

technical and regulatory parameters, but also on levels of public trust, user engagement, and the ability of local institutions to cooperate with social organisations (UNHCR, 2013). In this sense, blockchain may support not only administrative efficiency, but also local social-protection mechanisms by increasing transparency, improving access to information, and encouraging citizen participation (Werbach, 2018).

A four-phase implementation model for local government units

Given these barriers and institutional conditions, it is reasonable to adopt a phased model for the implementation of blockchain technology in local government units, one that is consistent both with the logic of multi-level governance and with the community-based protection approach (Bache & Flinders, 2004). This model would comprise four principal phases:

The pilot phase would involve the implementation of limited projects in selected areas of social services, such as digital vouchers, in order to test solutions under controlled conditions and identify implementation barriers (Swan, 2015).

The integration phase would connect new solutions to existing administrative infrastructure and digital-identification systems while taking into account interoperability standards at national and EU levels (Regulation (EU) No 910/2014, 2014).

The scaling phase would extend the use of the technology to additional areas of public services, supported by coordination mechanisms and funding instruments at the transnational level (European Commission, 2021).

The participatory phase would involve residents, civil-society organisations, and other stakeholders in the development and evaluation of the system, thereby strengthening its social legitimacy and its responsiveness to local needs (OECD, 2020a).

The distinctiveness of the proposed model lies in the fact that its successive stages refer not only to the general logic of implementing digital innovation, but also to characteristics specific to blockchain technologies, such as registry interoperability, the traceability of data flows and benefits, the verification of entitlements, and the accountability of actions undertaken by the different actors participating in the social-services system.

The feasibility of this model in resource-constrained local government units depends on reducing technological and organisational entry costs. For smaller municipalities, implementation should not begin with the construction of an autonomous blockchain system. A more realistic approach is to use shared national or EU-compliant infrastructure, externally supported pilot projects, modular solutions integrated with existing administrative systems, and inter-municipal cooperation. The minimum conditions for feasibility include a clearly delimited service area, a legal basis for data processing, access to technical expertise, staff training, accessibility support for users at risk of digital exclusion, and an evaluation mechanism that compares blockchain with simpler alternatives before scaling.

The model assumes a gradual and adaptive implementation process, which helps to reduce risk and to take more adequate account of diverse local conditions. At the same time, it reflects the structure of multi-level governance, in which the EU and national levels define the regulatory and technological framework, while the local level is responsible for implementation and for adapting solutions to specific social and institutional contexts (Treaty on European Union, 2012; Treaty on the Functioning of the European Union, 2012).

The inclusion of community-based protection in the participatory phase makes it possible to move from a purely administrative model towards a model of co-governance in which users of public services become co-creators of solutions. In this perspective, blockchain may serve as an infrastructure that supports not only public governance, but also local systems of social support, increasing their transparency, accessibility, and resilience to abuse (Tapscott & Tapscott, 2016).

At the same time, the participatory logic of community-based protection may slow decision-making

✉aneta.tylman@uni.lodz.pl, ✉marcin.podgorski@uni.lodz.pl

when compared with centralised blockchain governance models. This risk can be reduced by distinguishing between strategic participation and operational decision-making. Beneficiaries, civil-society organisations, and local communities should participate in needs assessment, design, monitoring, and evaluation, but not every operational decision should require broad consultation. A balanced model should therefore combine participatory legitimacy with clear administrative responsibility, predefined decision rules, and time-limited consultation procedures.

DISCUSSION

The analysis suggests four main findings. First, blockchain technology may support the revitalisation of social services only in selected areas where verifiable entitlements, auditable flows of resources, and coordination among multiple actors are required. Second, the EU multi-level governance model appears to offer a sector-specific advantage over US and Chinese models, as it combines interoperability, regulatory harmonisation, subsidiarity, and rights-based safeguards, but this advantage is conditional on implementation capacity at national and local levels. Third, within the adopted analytical framework, local government units emerge as key implementation actors because they translate supranational and national frameworks into locally adapted services and local social-infrastructure management. Fourth, community-based protection can strengthen legitimacy and inclusion, but it must be designed so that participation supports rather than paralyses administrative decision-making. These findings identify potential mechanisms and conditions, but they do not demonstrate general effectiveness in social-service delivery.

The present study addresses an important gap in the existing literature. Research on blockchain in the public sector has thus far focused primarily on technological architecture, legal regulation, digital identity, and financial applications, while much less attention has been paid to its role in the field of social services. At the same time, studies on multi-level governance and community-based protection have generally developed along separate analytical lines. By combining these perspectives, the present article proposes a more integrated understanding of digital innovation in local public services, one that relates technological solutions to the institutional structures and social relations within which they operate.

One of the main findings is that the effectiveness of blockchain implementation depends closely on the model of governance within which it is embedded. The comparative analysis suggests that the European Union model, grounded in multi-level governance, regulatory harmonisation, interoperability, and the protection of individual rights, appears to provide more favourable conditions for the development of blockchain-based public services than models shaped primarily by market logic or by centralised state control. Although the EU approach is institutionally more complex and often slower in implementation, this complexity appears particularly relevant in the field of social services, where efficiency must remain compatible with legality, trust, and social legitimacy.

The analysis also points to the central role of local government units in this process. Their significance derives not only from their responsibility for organising and delivering social services, but also from their position as the level of administration closest to citizens. In the context of multi-level governance, local government units function as actors linking strategic regulatory frameworks with the operational realities of service provision. Within this analytical perspective, their role extends beyond the technical implementation of innovation: it includes adapting technological solutions to local conditions, coordinating different institutional actors, and responding to the differentiated needs of beneficiaries. This suggests that the revitalisation of social services through blockchain is not simply a matter of digital modernisation, but also of local institutional capacity and administrative adaptability.

An important theoretical implication of the article lies in the integration of the community-based protection perspective with the framework of multi-level governance. This makes it possible to interpret

✉aneta.tylman@uni.lodz.pl, ✉marcin.podgorski@uni.lodz.pl

social services not solely as a field of hierarchical administrative provision, but also as a space of participation, co-creation, and shared responsibility. From this perspective, blockchain may support not only the efficiency of administrative procedures, but also the transparency and legitimacy of relations among local authorities, civil-society organisations, and service users. Its relevance therefore extends beyond information management and includes the strengthening of more participatory and network--based forms of public governance.

At the same time, the analysis points to substantial barriers that limit implementation. Legal uncertainty, data-protection requirements, weak interoperability with existing systems, shortages of administrative competences, limited financial and human resources, and the risk of digital exclusion all reduce the feasibility of broader deployment. These constraints are particularly important in the field of social services, where users often include vulnerable groups with unequal access to digital tools and varying levels of digital literacy. For this reason, blockchain should not be introduced in a uniform or indiscriminate manner. Its use should remain gradual, selective, and proportionate to the public value it is expected to generate in specific areas of service provision.

This underscores the need for a more critical interpretation of blockchain in public administration. The technology may strengthen accountability when several institutions must verify the same entitlement or transaction, but it may also create new governance risks, including dependence on external vendors, unclear responsibility for system errors, lock-in to particular technical standards, unequal access among users, and difficulty in modifying records when individual circumstances change. These risks are not secondary technical issues; in social services they directly affect legality, accessibility, and the protection of vulnerable beneficiaries.

In this context, the phased implementation model proposed in the article appears justified. By combining pilot testing, institutional integration, scaling, and participatory evaluation, it reflects both the logic of multi-level governance and the need to adapt technological innovation to local social conditions. Such an approach reduces implementation risk and makes it possible to assess the actual suitability of blockchain for particular segments of social services rather than assuming its value in advance. This is especially important in a sector where flexibility, responsiveness, and social legitimacy are as important as procedural efficiency.

More broadly, the analysis contributes to the debate on digital transformation in public administration by suggesting that blockchain in social services should be understood less as an autonomous driver of change and more as an element of institutional infrastructure whose effects depend on governance arrangements, regulatory coherence, and social embeddedness. In this respect, the study offers an integrated analytical framework that links blockchain technology, multi--level governance, and community-based protection in the analysis of local public services. This framework makes it possible to assess digital innovation in a way that captures both institutional coordination and the participatory dimension of service provision.

The limitations of the study should, however, be recognised more strongly. Because the analysis is conceptual, exploratory, and based on literature, documents, and illustrative empirical examples, its conclusions have an interpretative rather than statistically generalisable character. The article does not provide original fieldwork, beneficiary-level data, or direct measurement of changes in service efficiency, transparency, or inclusiveness. For this reason, the implementation model should be treated as a theoretically grounded proposal requiring empirical testing, not as a validated administrative procedure. Further research should include comparative local case studies, interviews with local administrators and beneficiaries, process-tracing of implementation decisions, and indicators measuring access, processing time, error correction, administrative costs, trust, and digital exclusion.

✉aneta.tylman@uni.lodz.pl, ✉marcin.podgorski@uni.lodz.pl

CONCLUSIONS

The article addressed the question of how blockchain technology, when embedded in multi--level governance and community-based protection, may influence the efficiency, transparency, and inclusiveness of social services delivered by local government units. The analysis shows potential rather than proven impact: blockchain may create public value mainly where social services require verifiable entitlements, auditable allocation of benefits, inter-institutional coordination, and transparent accountability among multiple actors.

The main theoretical conclusion is that blockchain should not be analysed as a stand-alone technological innovation. Its usefulness depends on the governance model within which it is implemented. The EU model is comparatively advantageous for social services not because it is faster or simpler than alternative models, but because it offers a more balanced combination of regulatory coherence, interoperability, subsidiarity, data protection, and citizen-rights safeguards. This makes it better suited to services involving vulnerable users and sensitive personal data than models driven primarily by market experimentation or centralised state control.

The main practical conclusion is that local government units should implement blockchain gradually and selectively. The proposed four-phase model – pilot testing, institutional integration, scaling, and participatory evaluation – is feasible only if it begins with limited service areas, uses shared or interoperable infrastructure, and includes legal, organisational, financial, and accessibility safeguards. For resource-constrained LGUs, blockchain should be considered only after comparison with simpler digital tools and only when its specific advantages outweigh implementation costs and risks.

The integration of community-based protection strengthens the social dimension of the proposed model by involving beneficiaries, civil-society organisations, and local communities in needs assessment, co-design, monitoring, and evaluation. However, participation must be balanced with clear administrative responsibility and efficient decision-making procedures.

The article's contribution lies in formulating an integrated analytical framework for examining the modernisation of local social services through the combined lens of blockchain technology, multi--level governance, community-based protection, and smart territorial governance. Future empirical research should test this framework through comparative local case studies and should measure the effects of blockchain-based solutions on access, efficiency, trust, accountability, digital exclusion, and the protection of vulnerable users. Until such evidence is available, blockchain should be approached as a conditional and selective instrument of digital local administration rather than as a universal mechanism for social-service revitalisation.

REFERENCES

Bache, I., & Flinders, M. (Eds.). (2004). *Multi-level governance*. Oxford University Press. https://doi.org/10.1093/0199259259.001.0001

Benchis, M. P., Shahzad, K., & Dan, S. (2025). Comparative analysis of blockchain adoption in the public and private sectors: A technology-organisation-environment (TOE) framework approach. *Journal of Innovation & Knowledge*, *10*(4), Article 100746. https://doi.org/10.1016/j.jik.2025.100746

Betts, A., & Collier, P. (2017). *Refuge: Transforming a broken refugee system*. Allen Lane.

Biasin, M., & Delle Foglie, A. (2024). Blockchain and smart cities for inclusive and sustainable communities: A bibliometric and systematic literature review. *Sustainability*, *16*(15), Article 6669. https://doi.org/10.3390/su16156669

Chen, Z. (2021). *Blockchain and state governance in China*. Springer. https://doi.org/10.1007/978-981-16-6415-1

Commodity Futures Trading Commission. (2017, October 17). *A CFTC primer on virtual currencies*. https://www.cftc.gov/sites/default/files/idc/groups/public/documents/file/labcftc_primercurrencies100417.pdf

Craig, P., & de Búrca, G. (2020). *EU law: Text, cases, and materials* (7th ed.). Oxford University Press. https://doi.org/10.1093/he/9780198856641.001.0001

Cyberspace Administration of China. (2019, January 10). 区块链信息服务管理规定 [Blockchain information

✉aneta.tylman@uni.lodz.pl, ✉marcin.podgorski@uni.lodz.pl

service management regulations]. https://www.cac.gov.cn/2019-01/10/c_1123971164.htm

Dimitriadis, K. A., Koursaros, D., & Savva, C. S. (2024). Evaluating the sophisticated digital assets and cryptocurrencies capacities of substituting international currencies in inflationary eras. *International Review of Financial Analysis*, *96*, Article 103693. https://doi.org/10.1016/j.irfa.2024.103693

Dimitriadis, K. A., Koursaros, D., & Savva, C. S. (2025a). Exploring the dynamic nexus of traditional and digital assets in inflationary times: The role of safe havens, tech stocks, and cryptocurrencies. *Economic Modelling*, *151*, Article 107195. https://doi.org/10.1016/j.econmod.2025.107195

Dimitriadis, K. A., Koursaros, D., & Savva, C. S. (2025b). The influential impacts of international dynamic spillovers in forming investor preferences: A quantile-VAR and GDCC-GARCH perspective. *Applied Economics*, *57*(45), 7175–7195. https://doi.org/10.1080/00036846.2024.2387868

Dunleavy, P., Margetts, H., Bastow, S., & Tinkler, J. (2006). *Digital era governance: IT corporations, the state, and e-government*. Oxford University Press. https://doi.org/10.1093/acprof:oso/9780199296194.001.0001

European Commission. (2017). *European interoperability framework – Implementation strategy* (COM(2017) 134 final). EUR-Lex. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52017DC0134

European Commission. (2020). *Shaping Europe's digital future* (COM(2020) 67 final). https://commission.europa.eu/publications/communication-shaping-europes-digital-future_en

European Commission. (2021). *Digital Europe Programme*. https://commission.europa.eu/funding-tenders/find-funding/eu-funding-programmes/digital-europe-programme_en

European Commission. (2022, July 28). *Digital Economy and Society Index (DESI) 2022*. https://digital-strategy.ec.europa.eu/en/library/digital-economy-and-society-index-desi-2022

European Commission. (2024). *Commission Implementing Decision (EU) 2024/1432 of 21 May 2024 setting up the European Digital Infrastructure Consortium for European Blockchain Partnership and European Blockchain Service Infrastructure (EUROPEUM-EDIC)*. (2024). Official Journal of the European Union, L 2024/1432. http://data.europa.eu/eli/dec_impl/2024/1432/oj

European Commission. (2026a). *European Blockchain Partnership*. Retrieved May 31, 2026, from https://digital-strategy.ec.europa.eu/en/policies/european-blockchain-partnership

European Commission. (2026b). *European Blockchain Services Infrastructure (EBSI)*. Retrieved May 31, 2026, from https://digital-strategy.ec.europa.eu/en/policies/european-blockchain-services-infrastructure

Finck, M. (2019). *Blockchain regulation and governance in Europe*. Cambridge University Press. https://doi.org/10.1017/9781108609708

Hausner, J. (Ed.). (2019). *Finanse publiczne* [*Public finance*]. Wydawnictwo Naukowe PWN.

Hooghe, L., & Marks, G. (2001). *Multi-level governance and European integration*. Rowman & Littlefield.

OECD. (2019). *OECD regional outlook 2019: Leveraging megatrends for cities and rural areas*. OECD Publishing. https://doi.org/10.1787/9789264312838-en

OECD. (2020a). *Bridging digital divides in G20 countries*. OECD Publishing.

OECD. (2020b). *Innovative citizen participation and new democratic institutions: Catching the deliberative wave*. OECD Publishing. https://doi.org/10.1787/339306da-en

Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge University Press. https://doi.org/10.1017/CBO9780511807763

Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation). (2016). Official Journal of the European Union, L 119, 1–88. http://data.europa.eu/eli/reg/2016/679/oj

Regulation (EU) 2023/1114 of the European Parliament and of the Council of 31 May 2023 on markets in crypto-assets, and amending Regulations (EU) No 1093/2010 and (EU) No 1095/2010 and Directives 2013/36/EU and (EU) 2019/1937. (2023). Official Journal of the European Union, L 150, 40–205. http://data.europa.eu/eli/reg/2023/1114/oj

Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC. (2014). Official Journal of the European Union, L 257, 73–114. http://data.europa.eu/eli/reg/2014/910/oj

Regulation (EU) 2024/1183 of the European Parliament and of the Council of 11 April 2024 amending

✉aneta.tylman@uni.lodz.pl, ✉marcin.podgorski@uni.lodz.pl

Regulation (EU) No 910/2014 as regards establishing the European Digital Identity Framework. (2024). Official Journal of the European Union, L 2024/1183. http://data.eu

Securities and Exchange Commission. (2019, April 3). *Framework for "investment contract" analysis of digital assets* [Withdrawn March 17, 2026]. https://www.sec.gov/about/divisions-offices/division-corporation-finance/framework-investment-contract-analysis-digital-assets

Smart Dubai Office. (2016). *Dubai blockchain strategy*. https://www.digitaldubai.ae/docs/default-source/publications/dubai-blockchain-strategy-en.pdf

Swan, M. (2015). *Blockchain: Blueprint for a new economy*. O'Reilly Media.

Tapscott, D., & Tapscott, A. (2016). *Blockchain revolution: How the technology behind Bitcoin is changing money, business, and the world*. Penguin.

Treaty on European Union (Consolidated version). (2012). Official Journal of the European Union, C 326, 13–46. http://data.europa.eu/eli/treaty/teu_2012/oj

Treaty on the Functioning of the European Union (Consolidated version). (2012). Official Journal of the European Union, C 326, 47–199. http://data.europa.eu/eli/treaty/tfeu_2012/oj

UNHCR. (2013). *Understanding community-based protection*. https://www.refworld.org/docid/5209f2574.html

Wamba, S. F., Wamba-Taguimdje, S.-L., Lu, Q., & Queiroz, M. M. (2024). How emerging technologies can solve critical issues in organisational operations: An analysis of blockchain-driven projects in the public sector. *Government Information Quarterly*, *41*(1), Article 101912. https://doi.org/10.1016/j.giq.2024.101912

Werbach, K. (2018). *The blockchain and the new architecture of trust*. MIT Press. https://doi.org/10.7551/mitpress/11449.001.0001

World Bank. (2017). *Distributed ledger technology (DLT) and blockchain* (FinTech note No. 1). https://openknowledge.worldbank.org/handle/10986/29053

✉aneta.tylman@uni.lodz.pl, ✉marcin.podgorski@uni.lodz.pl