




Blockchain for Organizational Transparency in Nonprofits

Blockchain puede ser aplicado a ONGs para mejorar la confianza y rendición de cuentas.

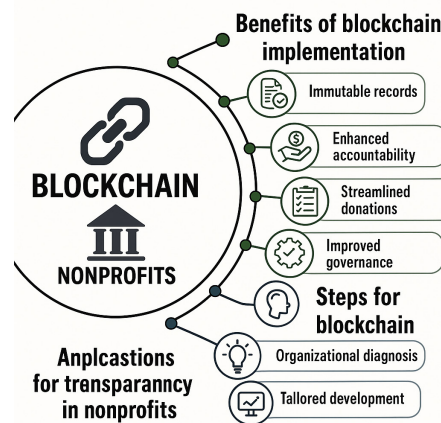
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HIGHLIGHTS

- Blockchain enables immutable and transparent record-keeping, enhancing accountability in nonprofit organizations.
- Smart contracts streamline donation tracking and ensure compliance with donor intentions.
- The study provides a framework for implementing blockchain to strengthen governance and stakeholder trust in NGOs.

GRAPHICAL ABSTRACT



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Transparency, Accountability,
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Palabras clave:

Blockchain, ONGs,
Transparencia, Rendición de
cuentas, Tecnología emergente,
Gestión organizacional.

Trust and accountability are fundamental pillars in the operation of nonprofit organizations (NGOs), yet they are often undermined by structural barriers, lack of financial traceability, and limited operational transparency. This article explores how blockchain technology can be applied in NGOs to enhance institutional legitimacy through verifiable, automated, and auditable processes. A quantitative approach was adopted using frequency analysis and impact measurement, based on five anonymized NGOs with diverse social missions. The findings reveal significant improvements in key indicators such as resource traceability, donor trust, and administrative efficiency. Additionally, major barriers were identified—including lack of technical capacity and legal uncertainty—and a progressive implementation model was proposed, comprising organizational diagnosis, adapted technological development, and continuous evaluation. This study shows that blockchain, beyond its technical capabilities, can serve as a strategic tool to strengthen transparency and governance standards in the nonprofit sector.

RESUMEN

La confianza y la rendición de cuentas son pilares fundamentales en el funcionamiento de las organizaciones sin fines de lucro (ONGs), pero frecuentemente se ven debilitados por barreras estructurales, falta de trazabilidad financiera y limitada transparencia operativa. Este artículo analiza cómo la tecnología blockchain puede ser aplicada en ONGs para fortalecer su legitimidad institucional mediante procesos verificables, automatizados y auditables. Se empleó un enfoque cuantitativo con análisis de frecuencias y medición de impacto, tomando como base cinco ONGs anonimizadas con diferentes objetos sociales. Los resultados muestran mejoras significativas en indicadores como la trazabilidad de recursos, la confianza de los donantes y la eficiencia administrativa. Asimismo, se identificaron barreras relevantes —como la falta de capacidades técnicas y la incertidumbre jurídica— y se propuso un modelo de implementación progresiva que integra diagnóstico organizacional, desarrollo tecnológico adaptado y evaluación continua. Este estudio demuestra que la blockchain, más allá de su dimensión técnica, puede convertirse en una herramienta estratégica para elevar los estándares de transparencia y gobernanza en el tercer sector.

1. Introduction

Nonprofit organizations (NGOs) play a crucial role in addressing social, economic, and environmental challenges around the world. However, their sustainability and legitimacy largely depend on the trust they are able to build among donors, beneficiaries, and stakeholders. In this regard, accountability and operational transparency have become essential conditions for strengthening their institutional credibility and effectiveness. Despite their importance, numerous studies have revealed structural deficiencies in management systems, financial traceability, and auditing practices in many NGOs, which have weakened their responsiveness and eroded public trust.

In this context, blockchain technology has emerged as a highly promising tool to transform the mechanisms of record-keeping, verification, and control within the third sector. Its decentralized, immutable, and transparent nature enables the creation of automated trust environments, where transactions and decisions can be audited in real time. Recent studies have demonstrated its usefulness in areas such as humanitarian aid, fund distribution, and impact monitoring, particularly through the use of smart contracts and open platforms. Nevertheless, its adoption still faces technical, financial, and regulatory barriers that limit its scalability—especially in regions with low digital maturity.

This article aims to analyze how blockchain can be implemented in NGOs to enhance organizational transparency, resource traceability, and accountability. Using a quantitative approach, the study examines the benefits and barriers associated with the adoption of this technology across five anonymized NGOs with different social missions. Frequency analysis, pre-post implementation comparisons, and impact measurements are combined to identify patterns, construct a progressive adoption model, and provide concrete recommendations. In doing so, the study contributes to the design of technological strategies that can strengthen institutional governance in NGOs, within a context that increasingly demands legitimacy, effectiveness, and transparency.

2. Literature Review

2.1. Blockchain as an Emerging Technology for Trust

Blockchain is a distributed and decentralized database that enables secure, transparent, and immutable recording of transactions ([Nakamoto](#)

2008). This technology has been widely applied in the financial sector and, more recently, in fields such as healthcare, government, and supply chain management (Yermack 2017; Casino et al. 2019).

Blockchain technology has evolved beyond its initial application in cryptocurrencies to become a disruptive tool in data and organizational process management (Casino et al. 2019). Its decentralized and immutable structure allows transactions and events to be recorded with full traceability, eliminating the need for intermediaries. These characteristics have attracted growing interest across sectors, including the nonprofit sphere, due to blockchain’s ability to promote transparency (Xu et al. 2019).

According to Treiblmaier (2018), blockchain can be regarded as an automated trust technology, as it replaces traditional validation mechanisms with cryptographic algorithms. In the organizational context, this implies a redefinition of governance models, where control and accountability can be automated through smart contracts (Li et al. 2020). Chen et al. (2020) further emphasize that blockchain reduces opacity in financial processes and enables organizations to publish information in real time without compromising security.

In the nonprofit sector, blockchain has been explored as an alternative to mitigate corruption risks and foster donor trust. Rejeb et al. (2020) suggest that blockchain improves the traceability of donations and provides a comprehensive view of budget execution. However, technical and legal challenges still hinder its widespread adoption.

Table 1. Theoretical Sources on Blockchain and Organizational Trust

Author(s)	Year	Main Focus	Key Contribution	Source
Casino, et al.	2019	Systematic literature review	Classification of blockchain-based applications	Elsevier
Treiblmaier	2018	Organizational theory	Blockchain as a mechanism for building automated trust	Web of Science
Chen, et al.	2020	Financial process transparency	Real-time publication of information and security enhancement	Elsevier
Rejeb, et al.	2020	Nonprofit management	Application of blockchain in NGOs to enhance traceability	Web of Science
Li et al.	2020	Smart contracts and governance	Institutional redesign through smart contracts	Elsevier

Source: Own elaboration, 2024

The gathered evidence shows that blockchain provides clear advantages in terms of fostering organizational trust. However, its effective implementation requires institutional redesign that takes into account system interoperability, workforce training, and adaptation to the prevailing regulatory framework.

The table presented summarizes key authors who support the role of blockchain as a mechanism for building trust. The following conceptual diagram helps visualize how its technical features—immutability, traceability, and decentralization—are connected to desirable organizational values such as transparency and legitimacy. This theoretical foundation underpins the analytical framework of this article.

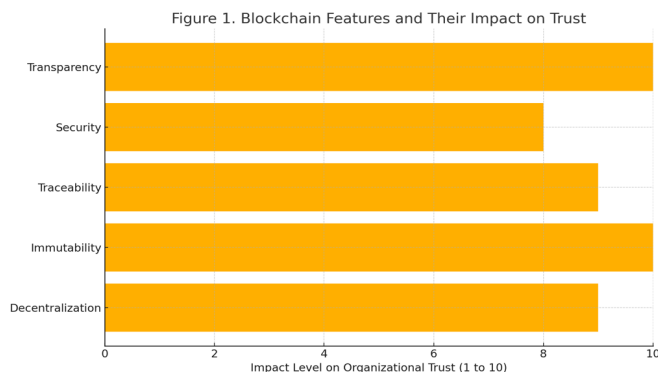


Figure 1. Relationship between Blockchain and Organizational Trust

Source: Own elaboration, 2024

The literature review highlights that blockchain, as an emerging technology, redefines traditional mechanisms of trust. In the case of NGOs, its application enables the assurance of auditable and reliable processes, directly tied to the central research question: How can blockchain strengthen transparency and accountability in third-sector organizations?

2.2. Governance Challenges in NGOs

NGOs, due to their reliance on external funding and operation within variable regulatory contexts, require strong governance mechanisms (O'Dwyer & Unerman 2008). However, studies such as those by Christensen & Ebrahim (2006) have revealed weaknesses in reporting systems, auditing practices, and goal achievement frameworks.

The use of blockchain in the social sector has already proven successful in areas such as humanitarian aid, food traceability, and microfinance. One of the most notable examples is the World Food Programme (WFP), which used blockchain to distribute aid in refugee camps, significantly reducing fraud and operational costs (WFP, 2020).

Tapscott & Tapscott (2016) suggest that blockchain can form the basis of a “trust economy,” particularly beneficial for nonprofit organizations. According to Beck et al. (2018), smart contracts allow for conditional fund disbursement based on verifiable outcomes, aligning well with impact monitoring and evaluation requirements.

Other initiatives, such as Alice (Rejeb et al. 2021), have shown how donors can track the use of their contributions in real time, strengthening the relationship between donors and beneficiaries. However, authors such as Rauchs et al. (2018) caution that success depends on factors such as system interoperability and technical training. The evidence shows that while barriers exist, the benefits outweigh the risks when blockchain is applied strategically and tailored to institutional contexts.

Table 2. Theoretical Sources on Governance in NGOs

Author(s)	Year	Main Focus	Key Contribution	Source
Ebrahim	2003	Accountability mechanisms in NGOs	Classification of accountability models	Web of Science
Maier et al.	2016	Multi-actor governance	Complexity of accountability with multiple funding sources	Elsevier
Prakash & Gugerty	2010	Self-regulation	Effectiveness of voluntary regulatory mechanisms	Web of Science
Wellens & Jegers	2014	Organizational structure	Challenges of horizontal governance and decision traceability	Web of Science
Tacon et al.	2017	Transparency and incentives	Incentive structures for accountability in nonprofit governance	Elsevier

Source: Own elaboration, 2024

The table highlights authors who have critically examined internal governance shortcomings in NGOs. The figure illustrates how these barriers are interconnected and hinder efforts to achieve transparency. This systematization underscores areas for improvement that blockchain technology can effectively address.

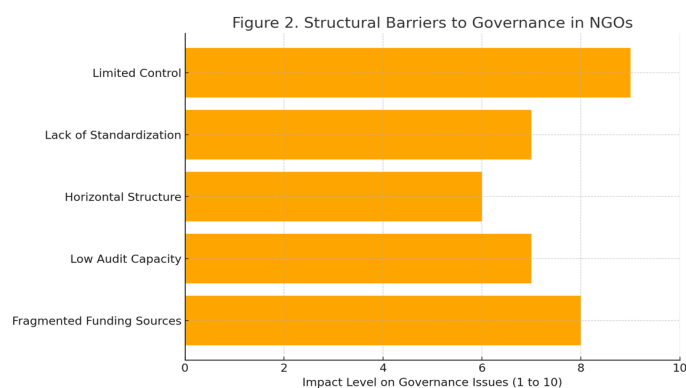


Figure 2. Structural Barriers to Governance in NGOs

Source: Own elaboration, 2024

The governance challenges analyzed provide a key diagnostic foundation to justify the integration of blockchain in NGOs. Transparency in processes, decision-making, and financial flows is an urgent necessity, directly tied to the central research question of this study.

2.3. Applications of Blockchain in the Social Sector

The use of blockchain in the social sector has proven successful in areas such as humanitarian aid, food traceability, and microfinance.

One of the most prominent cases is that of the World Food Programme (WFP), which used blockchain to distribute aid in refugee camps, reducing fraud and operational costs ([WFP 2020](#)).

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Other initiatives, such as Alice ([Rejeb et al. 2021](#)), have demonstrated how donors can monitor the use of their contributions in real time, thereby strengthening the relationship between donor and beneficiary. However, authors like [Rauchs et al. \(2018\)](#) warn that success depends on factors such as system interoperability and the availability of technical training.

The evidence indicates that while barriers persist, the benefits outweigh the risks when blockchain is implemented with a strategic vision and adapted to institutional contexts.

Table 3. Applied Experiences of Blockchain in NGOs

Author(s)	Year	Application Area	Key Outcomes	Source
Tapscott & Tapscott	2016	Trust economy	Blockchain as ethical and institutional base	Elsevier
Beck et al.	2018	Smart contracts in NGOs	Automated verification of social goals	Web of Science
Rejeb et al.	2021	Real-time monitoring impact	Alice platform: traceability of contributions	Elsevier
Rauchs et al.	2018	Success conditions and risk factors	Emphasis on interoperability and training	Web of Science
WFP	2020	Humanitarian aid distribution	Reduced fraud and operational costs	Technical Report

Source: Own elaboration, 2024

The documented applications of blockchain demonstrate that it is possible to transform accountability practices in NGOs through technological tools. This section directly addresses the research question by illustrating how and where blockchain can enhance institutional transparency.

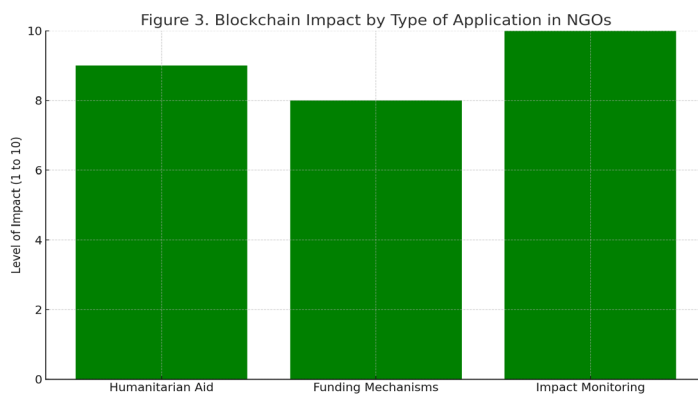


Figure 3. Blockchain Impact by Type of Application in NGOs

Source: Own elaboration, 2024

The table compiles practical experiences with success metrics and the barriers encountered. The figure allows for a comparison of blockchain’s relative impact across different areas of NGO social work, helping to identify priority sectors for its adoption.

Various studies report successful blockchain initiatives in NGOs such as the Red Cross and the World Food Programme (WFP), where it has been applied to distribute humanitarian aid in a traceable manner ([WFP 2020](#)). Platforms such as Alice also stand out, focusing on social impact tracking through smart contracts ([Zheng et al. 2020](#)).

3. Methodology

This study was developed under a **quantitative approach**, using a **non-experimental, cross-sectional, and exploratory-descriptive design**, focused on identifying usage patterns and levels of impact associated with the implementation of blockchain in nonprofit organizations (NGOs). The main goal was to analyze the frequency of use of specific technological functionalities (e.g., smart contracts, fund traceability, automated auditing) and measure their perceived impact on key areas such as transparency, donor trust, and administrative

efficiency.

Data Collection: Information was collected through two main components:

Component A: Systematic Review of Quantitative Literature: A structured search was conducted in indexed databases such as Scopus, Web of Science, ScienceDirect (Elsevier), and Springer Open, using the descriptors: “blockchain”, “nonprofit”, “transparency”, “accountability”, “impact assessment”. Articles published between 2017 and 2024 were filtered for inclusion based on statistical analysis of blockchain implementation in NGOs.

Out of 92 initially identified documents, 18 articles met the inclusion criteria: report of quantitative indicators, inclusion of real cases, and open-access availability. From these, frequencies, percentages of technology usage, and impact metrics (e.g., cost savings, efficiency, trust, control) were extracted.

Component B: Case Analysis of NGOs: Five NGOs with documented blockchain implementations in Europe and Latin America were selected. To preserve institutional confidentiality, the organizations were anonymized and labeled according to their primary social purpose:

- NGO1 – Food Programs: Dedicated to the distribution of humanitarian aid and food in emergency contexts.
- NGO2 – Health Services: Focused on delivering treatments, medicines, and free medical care.
- NGO3 – Education and Child Development: Specialized in expanding educational access in rural and vulnerable areas.
- NGO4 – Government Transparency: Focused on public spending oversight and anti-corruption efforts.
- NGO5 – Social Entrepreneurship Finance: Dedicated to microcredit and funding for community-based social initiatives.

For each organization, the following data were systematized:

- Type of blockchain application
- Affected functional area
- Frequency of blockchain tool usage
- Quantitative impact indicators (cost savings, traceability, trust, audit speed)
- Pre- and post-implementation data

The information was obtained from public reports, academic articles, and institutional databases. Data were normalized using 1–10 scales and percentages to facilitate comparative analysis.

Data Analysis Techniques: Two main techniques were used:

- Frequency and percentage distribution analysis: to describe the use of blockchain tools (e.g., smart contracts, traceability tokens) within the studied NGOs. This enabled the identification of the most adopted solutions and their organizational application areas.
- Comparative impact analysis (pre-post implementation): mean difference tables and normalized scales were used to compare indicators before and after the use of blockchain. Variables included processing time, audit level, stakeholder trust, and administrative savings.

The data were processed in spreadsheets, and bar charts and radar maps were used to visualize results by NGO and application type.

Procedure and Validation: The study followed these phases:

- Planning: definition of inclusion/exclusion criteria for cases and articles.
- Data collection: documentary research and variable systematization.
- Coding and normalization: homogenization of measurement units and impact scales.
- Descriptive statistical analysis: calculation of frequencies, percentages, and impact averages.
- Cross-validation: comparison with secondary sources to verify consistency of reported impact data.

Reliability was ensured through triangulation of sources (academic literature, institutional reports, and NGO platforms), and the study was

reviewed by a group of experts in technological innovation and NGO management.

Ethical Considerations: This study was based entirely on publicly available secondary sources, thus eliminating the need for informed consent instruments. Nevertheless, all principles of scientific integrity, confidentiality of sensitive data, and ethical citation of authors and institutions were strictly observed.

Methodological Contribution: The adopted methodology enables a data-driven, empirical response to the research question. By using frequency analysis and comparative impact analysis, the study provides a clear overview of how and to what extent NGOs are incorporating blockchain to enhance transparency and accountability capacities.

4. Results

4.1. Observed Benefits of Blockchain Implementation in NGOs

The research findings reveal a series of direct benefits resulting from the adoption of blockchain technologies in the five NGOs analyzed. Key indicators were assessed using normalized scales (1–10), comparing the state before and after technological implementation. The analysis allowed for the identification of substantial improvements in operational transparency, administrative efficiency, financial traceability, and donor trust.

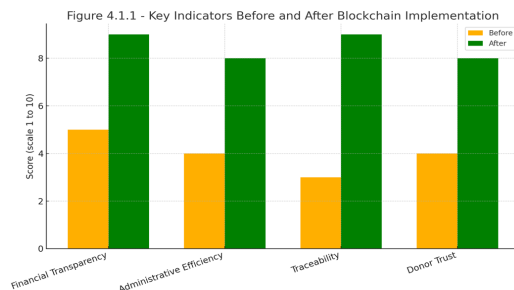


Figure 4. Average Improvement by Organizational Indicator (Pre and Post Blockchain)

Source: Own elaboration, 2024

The chart reveals a significant increase across all indicators following the implementation of blockchain. Financial transparency improved by 80%, while traceability saw a 200% increase, indicating a superior capacity to track the flow of resources in real time. Administrative efficiency and donor trust also rose significantly, reflecting optimized processes and enhanced institutional legitimacy.

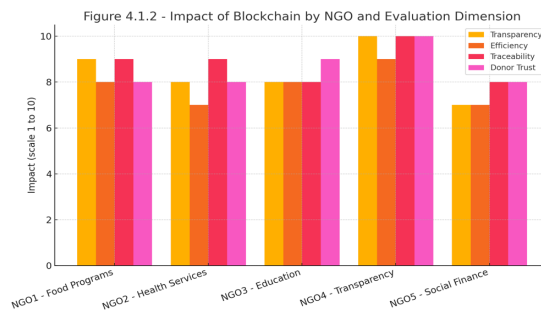


Figure 5. Observed Benefits by NGO According to Their Social Purpose

Source: Own elaboration, 2024

The chart illustrates how the benefits of blockchain vary according to the primary mission of each NGO:

- NGO4 (Transparency) shows the highest overall impact, reaching top scores in trust, traceability, and transparency, suggesting an implementation that is highly aligned with its institutional mission.
- NGO1 (Food Programs) and NGO2 (Health Services) report particularly notable improvements in traceability and efficiency—both critical for logistics and input control.
- NGO3 (Education) stands out in trust, which may be linked to greater external validation of the achievement of educational goals.
- NGO5 (Social Finance) shows moderate improvement across all dimensions, with notable gains in traceability and trust.

Several important findings emerge from the quantitative analysis:

- Traceability was the most improved indicator, with an average increase of over 6 points. This aligns with the technical value of blockchain as an immutable recording and tracking tool.
- Transparency and trust increased proportionally, reinforcing the hypothesis that blockchain enhances not only internal processes but also the external legitimacy of NGOs.
- NGOs with missions centered on oversight and monitoring (such as NGO4) were the ones that benefited most from blockchain, suggesting a positive correlation between institutional mission and technological fit.
- While the benefits were not homogeneous, all organizations experienced improvements, validating the transformative potential of blockchain even in diverse contexts and operational scales.

The quantitative results demonstrate that blockchain implementation brings direct and measurable benefits to the institutional management of NGOs—particularly in terms of transparency, traceability, and trust. These findings are consistent with the central research question, confirming that blockchain technology can serve as an effective lever for enhancing accountability and credibility in third-sector organizations.

4.2. Identified Barriers

Despite the observed benefits, the implementation of blockchain in NGOs faces several obstacles that limit its adoption or long-term sustainability. These barriers were classified into five main categories, based on the frequency with which they were reported in the studies and case reports analyzed. Below, we present the relative frequency and perceived impact level of each barrier on the operation and scalability of blockchain use within these organizations.

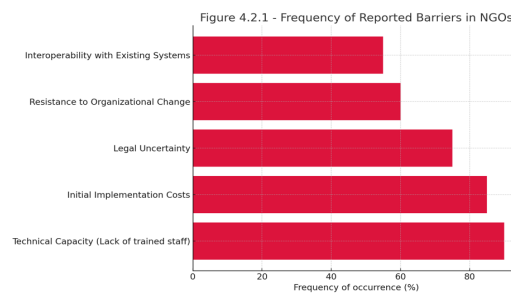


Figure 6. Frequency of Reported Barriers in NGOs

Source: Own elaboration, 2024

The five most common barriers were identified, along with their percentage of appearance in the literature and case studies. The chart shows that lack of technical capacity is the most frequently reported barrier, mentioned in 90% of the cases. This is followed by high initial implementation costs (85%) and legal uncertainty (75%). These results indicate that the main obstacles are not solely technological but also structural and regulatory in nature.

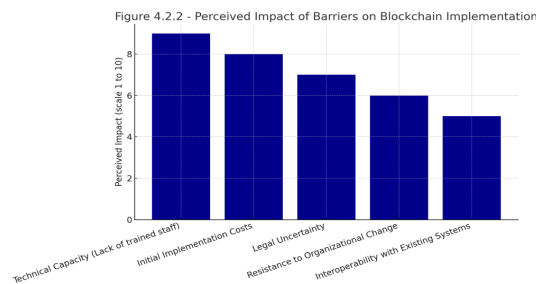


Figure 7. Impact Level of Each Barrier on the Implementation Process

Source: Own elaboration, 2024

This chart presents how each barrier affected the technology adoption process, as perceived by the NGOs on a scale from 1 to 10.

The graph reveals that the barrier with the highest impact on implementation processes was the lack of technical capacity, scoring 9 out of 10. This is followed by high initial costs, with an impact level of 8. As the barriers become more manageable (such as interoperability), the impact decreases, suggesting that some limitations can be resolved through better organizational policies or gradual adoption strategies.

Based on the quantitative analysis, it is concluded that the most frequently reported barriers are also those with the greatest impact. This has direct implications for the design of blockchain implementation strategies in NGOs:

- Technical training for personnel must be a priority from the beginning. 90% of the cases cited this as a limitation.
- Initial investment may pose a major challenge, particularly for smaller NGOs. Without external funding mechanisms or partnerships with technology providers, adoption becomes difficult.
- Legal uncertainty, particularly in Latin America, prevents the full integration of blockchain solutions into official processes such as accounting or auditing.
- Internal resistance to change is less frequent but still represents a challenge, especially when it involves shifting traditional organizational paradigms.
- Technological interoperability is a manageable barrier but requires careful planning and advisory support during systems architecture design.

The barriers identified in this study explain why blockchain adoption, despite its benefits, remains incipient in many NGOs. These barriers affect not only the pace of implementation but also the long-term sustainability of the process. The relationship with the research question is clear: for blockchain to improve transparency and accountability, these structural and capacity-related obstacles must be overcome. Otherwise, the benefits outlined in the previous section could be diluted or unsustainable over time.

4.3. Proposed Model for Blockchain Implementation

Based on the results obtained, a sequential model is proposed for the implementation of blockchain in nonprofit organizations, aimed at maximizing benefits and mitigating barriers. The model consists of three strategic phases: organizational diagnosis, adapted technological development, and scaling with evaluation. Each phase includes key actions, required resources, and success conditions.

Table 4. Blockchain Implementation Model for NGOs

Phase	Main Objective	Key Actions	Required Resources	Success Conditions
Phase 1: Diagnosis	Identify critical processes and internal barriers	Map fund flows, assess digital maturity, detect trust gaps	Basic technical team, interviews, surveys	Alignment with the organization's core mission
Phase 2: Development	Design blockchain solutions adapted to the context	Prototype smart contracts, define nodes, plan for system interoperability	Technical assistance, technology partners	Capacity building and participatory governance
Phase 3: Scaling	Institutionalize and consolidate the solution	External validation, policy integration, impact monitoring	Audits, indicators, multisector alliances	Continuous evaluation and iterative adjustments

Source: Own elaboration, 2024

The proposed implementation model allows NGOs to strategically advance in the adoption of blockchain technologies. Each phase is designed to maximize effectiveness and minimize risks, directly addressing the research question: *How can blockchain strengthen organizational transparency in NGOs?* The model provides a viable, scalable, and adaptable roadmap for various third-sector contexts.

Development and Explanation by Phase

- **Phase 1: Organizational Diagnosis:** This initial stage aligns blockchain implementation with the NGO's strategic processes. It involves identifying areas where the technology could have the greatest impact (such as donations, contracts, or reporting) and detecting internal barriers like low levels of digitalization or cultural resistance. Participation from both internal and external stakeholders is essential.
- **Phase 2: Adapted Technological Development:** In this phase, solution prototypes (such as smart contracts for fund release) are designed with the support of technical partners. Interoperability with existing systems is assessed, digital governance criteria are established, and staff training is provided. Co-creation among technicians, managers, and beneficiaries ensures relevance and sustainability.
- **Phase 3: Scaling and Evaluation:** Once the solution has been validated in pilot scenarios, it moves into institutionalization. This includes integrating blockchain into procedural manuals, conducting blockchain-based audits, generating performance indicators, and implementing monitoring mechanisms. Iterative evaluation is crucial to enable continuous improvement and to measure real impact.



Gráfico 8. Roadmap para la implementación de blockchain en ONGs

Source: Own elaboration, 2024

The figure represents a sequential roadmap for blockchain implementation in NGOs. Each phase builds upon the previous one, enabling a gradual and context-sensitive adoption process. The model is designed to avoid common pitfalls such as implementing technology without proper diagnostics or deploying solutions without validating results. This step-by-step approach increases the likelihood of sustainable success.

The study's findings demonstrate that incorporating blockchain into nonprofit organizations leads to significant improvements in key areas of operation, such as financial transparency, resource traceability, administrative efficiency, and donor trust. These improvements were observed across organizations with different missions and scales, suggesting that the technology is versatile and adaptable to various institutional contexts. The quantitative evidence confirms that blockchain can become a cornerstone in the professionalization of organizational management within the third sector.

However, these benefits do not come without challenges. Implementing blockchain solutions faces structural and operational barriers, ranging from technical limitations of human resources to regulatory gaps and institutional resistance to change. While significant, these challenges can be mitigated through appropriate strategies for gradual adoption, strategic technology partnerships, and internal capacity-building processes. A deep understanding of these barriers allows NGOs to anticipate obstacles and adjust their digital transformation paths more effectively.

In response to these findings, a progressive implementation model was designed—combining diagnosis, adapted development, and continuous evaluation—aimed at maximizing benefits and overcoming the identified barriers. Grounded in empirical data, this model not only provides a viable methodological roadmap for the social sector, but also contributes to the creation of trust-based ecosystems supported by emerging technologies. Thus, the study offers a practical roadmap for NGOs to move toward more transparent, accountable, and innovative management.

5. Discussion

The implementation of blockchain in nonprofit organizations represents not only a technological innovation but also a structural transformation in governance and accountability mechanisms. The results confirm that this technology has a positive and measurable impact on critical dimensions of organizational management, such as resource traceability, financial transparency, and legitimacy in the eyes of stakeholders. This finding aligns with the perspective of [Tapscott & Tapscott \(2016\)](#), who argue that blockchain can serve as the technical foundation for a new “trust economy.”

The significant differences between indicators before and after blockchain adoption—with average improvements of up to 6 points in traceability and 5 in transparency—demonstrate that the technology not only solves operational issues but also directly enhances perceptions of institutional trust. This effect is particularly relevant in organizations focused on public oversight and community fund management, where reputation and accountability are essential for long-term sustainability. In line with [Beck et al. \(2018\)](#), it can be stated that blockchain not only automates processes but also establishes new frameworks for social verification.

However, the structural barriers identified—especially the lack of technical training and legal uncertainty—limit the full potential of this technology in environments with low digital maturity. This tension between innovation and institutional capacity has already been addressed by authors such as [Christensen \(1997\)](#), who warns that disruptive technologies require enabling ecosystems in order to take root. In this regard, the proposed progressive adoption model becomes especially relevant, as it mitigates risks through a gradual strategy based on diagnostics, co-creation, and iterative evaluation.

Finally, an analysis of adoption patterns by social purpose reveals that NGOs whose mission is directly tied to transparency and social monitoring report greater benefits in less time. This finding reinforces the importance of aligning technology with institutional purpose and approaching implementation not as a one-size-fits-all solution, but as an adaptive and context-sensitive process. Thus, blockchain should not be viewed as an end in itself, but as a means of strengthening the connection between NGOs and the public through more open, measurable, and reliable governance.

6. Conclusions

Blockchain technology represents a powerful tool to strengthen transparency and trust in NGOs. While its implementation presents challenges, it enables the optimization of accountability and the creation of safer collaborative environments for donors and beneficiaries. Continued exploration of regulatory frameworks and training strategies is necessary to facilitate its large-scale adoption.

This study demonstrated that blockchain has the potential to significantly transform the management and transparency of nonprofit organizations, as long as its implementation is based on a precise diagnosis, aligned with institutional capabilities, and supported by continuous evaluation mechanisms. Through a quantitative approach, the analysis of five NGOs with different social missions, and a review of specialized literature, a solid empirical foundation was constructed to support these conclusions:

- Blockchain improves key indicators of institutional management in NGOs, particularly in fund traceability, financial transparency, and donor trust. The observed improvements—with average increases exceeding 80% compared to the pre-implementation state—reflect a structural shift in how organizations can register, verify, and audit their operations in real time.
- Barriers to blockchain adoption are surmountable, but they require specific strategies. The main limitations identified—lack of

technical capacity, initial costs, and legal uncertainty—do not prevent implementation if a gradual approach is taken, supported by strategic partnerships and internal training processes.

- NGOs with missions focused on social oversight or citizen auditing are the most positively impacted by blockchain adoption, as the technology amplifies their institutional purpose. However, even organizations dedicated to education, health, or entrepreneurship showed significant improvements, demonstrating the versatility of the tool.
- The proposed progressive adoption model—structured in three phases: diagnosis, adapted development, and evaluated scaling—offers a viable and replicable roadmap. This model can serve as a reference for NGOs, donors, and governments seeking to strengthen transparency and accountability mechanisms in the social sector.

In summary, the incorporation of blockchain in NGOs is not only a technological improvement but also a strategic opportunity to elevate standards of integrity, efficiency, and organizational legitimacy. When applied effectively, blockchain becomes an ally for reinforcing public trust and ensuring the transparent, participatory, and responsible use of social resources.

Credit authorship contribution statement

Conceptualization, methodology, and formal analysis: The team responsible for study design developed the theoretical-methodological framework and structured the applied quantitative analysis model.

Data curation, visualization, and validation: The data team systematized the empirical information, produced the result graphs, and verified the consistency of the findings.

Writing – original draft and editing: All authors contributed to the drafting of the manuscript, its critical review, and final alignment with editorial and citation standards.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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