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Contemporary Local Governance, Wellbeing and Sustainability

Edited by
Pedro Miguel Alves Ribeiro Correia

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Editor

Pedro Miguel Alves Ribeiro Correia

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About the Editor

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Pedro Miguel Alves Ribeiro Correia holds a PhD in Social Sciences (Specialty in Public Administration) from the Technical University of Lisbon, a degree in Law from the University of Lisbon Law School, a degree in Statistics and Information Management from the NOVA University Lisbon Information Management School, and a degree in General Studies (with a Major in Juridical Studies and a Minor in Physics) from the University of Lisbon School of Arts and Humanities. He is an Invited Associate Professor at the University of Coimbra Faculty of Law, a Senior Researcher at the University of Coimbra Institute for Legal Research (UCILeR), a Consultant (by nomination) at the Portuguese Ministry of Justice (Legislative Policy and Strategic Planning Area), a Visiting Full Professor at ICET/CUA/UFMT, and Foreign Collaborator of international research groups. He has published more than 210 articles in specialized, scientific, peer-reviewed journals and 26 works in scientific events annals. He has written, organized, or edited 4 books and has written 78 book chapters. He has circa 500 items of other various technical productions and participated in 55 events in Portugal and abroad. He has supervised and co-supervised dozens of doctoral theses, master's dissertations, and works of graduation/bachelor's degrees. He has received eight awards and/or honors. His main work areas are Social Sciences with an emphasis on Political Sciences, Economics and Management (Public Administration, Public Policy, Interdisciplinary and Law) and Exact Sciences with an emphasis on Mathematics, Computer and Information Sciences (Statistics, Data Analysis and Data Mining). In his professional activities, he has interacted with more than 100 collaborators in co-authoring scientific works. In his curriculum, the most frequent terms in the context of scientific and technological production are Statistics, Data Analysis, Justice, Successive Impact Assessment, Public Policies, and Public Administration.

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Editorial

Editorial for the Special Edition—Contemporary Local Governance, Wellbeing, and Sustainability: Integrating Digital Innovations and Societal Trust for Future Resilience

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1. Introduction

In the evolving landscape of local governance, the intersection of digital technology, citizen engagement, and sustainability presents unique opportunities and challenges. This special edition of the MDPI *Social Sciences* journal explores how contemporary local governance can leverage these factors to enhance public wellbeing and sustainability. The eleven papers included in this edition provide a comprehensive view of best practices, technological advancements, and sociopolitical dynamics that shape the governance landscape across different regions and contexts, forming a tapestry of eleven interconnected studies that delve into the critical role of local governance in shaping the wellbeing and sustainability of our communities. As the world grapples with complex challenges, local authorities stand at the forefront, navigating a web of opportunities and hurdles in their pursuit of a brighter future. These diverse studies collectively offer a nuanced understanding of the contemporary landscape of local governance and pave the way for further exploration and innovation.

2. The Papers

The papers included in this special edition are listed below:

1. Contested Borderlands: Experimental Governance and Statecraft in the Laos Golden Triangle Special Economic Zone;
2. Best Practices for Municipalities to Promote Online Citizen Participation and Engagement on Facebook: A Narrative Review of the Literature;
3. Digital Access to Judicial Services in the Brazilian Amazon: Barriers and Potential;
4. The Challenges of Artificial Intelligence in Public Administration in the Framework of Smart Cities: Reflections and Legal Issues;
5. Trust, Corruption, and Tax Compliance in Fragile States: On a Quest for Transforming Africa into Future Global Powerhouse;
6. A Quantitative Study on the Factors Influencing Implementation of Cybersecurity Laws and Regulations in Pakistan;
7. The Tick Issue as a Reflection of Society–Nature Relations: Localized Perspectives, Health Issues and Personal Responsibility—A Multi-Actor Sociological Survey in a Rural Region (The Argonne Region, France);
8. Local Governments Facing Turbulence: Robust Governance and Institutional Capacities;
9. The Inner Functioning of Local Governance Networks in Centralized Countries: A 'Brave New World'?;
10. Public Trust in the Time of Pandemic: An Analysis of Social Networks in the Discourse of Large-Scale Social Restrictions in Indonesia;
11. Advancing Sustainable Bio-Waste Management through Law and Policy: How Co-Creation Can Help Pursue Fair Environmental Public Policies in the European Context.

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3. Governance in Transition: Experimental Zones and Digital Engagement

"Contested Borderlands: Experimental Governance and Statecraft in the Laos Golden Triangle Special Economic Zone" examines the experimental nature of governance within special economic zones (SEZs). This paper explores how state and non-state actors navigate sovereignty, legality, and economic imperatives in this contested region, revealing the tensions inherent in balancing local wellbeing and global economic agendas.

4. Digital Engagement and Participation

"Best Practices for Municipalities to Promote Online Citizen Participation and Engagement on Facebook: A Narrative Review of the Literature" underscores the significance of digital platforms in fostering community involvement. This paper reviews the successful strategies that municipalities can employ to enhance citizen engagement through social media, particularly Facebook. Digital engagement not only facilitates more inclusive decision-making processes but also fosters transparency and accountability in governance. These elements are crucial for building public trust, a recurring theme across several papers in this edition.

5. Access to Judicial Services in Remote Areas

Complementing the discussion on digital engagement, "Digital Access to Judicial Services in the Brazilian Amazon: Barriers and Potential" highlights the critical role of digital infrastructure in providing essential services to remote and underserved communities. This paper identifies significant barriers, such as limited internet access and technological literacy, which impede the effective delivery of judicial services. It emphasizes the potential of digital platforms to bridge these gaps, ensuring equitable access to justice. This connects with broader discussions on digital inclusion and the necessity of robust infrastructure, as highlighted in studies on artificial intelligence and cybersecurity.

6. Artificial Intelligence in Smart Cities

"The Challenges of Artificial Intelligence in Public Administration in the Framework of Smart Cities: Reflections and Legal Issues" explores the integration of artificial intelligence into urban governance, emphasizing both its potential benefits and inherent risks. Artificial intelligence can significantly enhance the efficiency of service delivery, but it also raises critical legal and ethical concerns. These include issues of privacy, data security, and the potential for biased decision-making. This paper argues for the establishment of comprehensive legal frameworks to govern artificial intelligence use, ensuring that its deployment promotes fairness and accountability. This theme resonates with discussions on cybersecurity and public trust, illustrating the interconnected nature of these governance challenges.

7. Trust, Corruption, and Compliance

"Trust, Corruption, and Tax Compliance in Fragile States: On a Quest for Transforming Africa into Future Global Powerhouse" examines how corruption undermines public trust and hampers tax compliance, presenting a significant barrier to economic development in fragile states. This paper suggests that building transparent and accountable institutions is crucial for fostering trust and encouraging compliance. This connects to the broader theme of trust discussed in the context of digital engagement, artificial intelligence deployment, and governance during crises. Building public trust is foundational to effective governance and sustainable development.

8. Cybersecurity and Legal Implementation

"A Quantitative Study on the Factors Influencing Implementation of Cybersecurity Laws and Regulations in Pakistan" identifies critical factors that affect the implementation of cybersecurity laws, such as political will, institutional capacity, and public awareness. Effective cybersecurity is essential for protecting digital infrastructure and ensuring the

integrity of online services. This paper's findings are closely related to discussions on digital judicial services and artificial intelligence, highlighting the need for robust legal and regulatory frameworks to safeguard public trust and security in the digital age.

9. Society–Nature Relations

"The Tick Issue as a Reflection of Society–Nature Relations: Localized Perspectives, Health Issues and Personal Responsibility—A Multi-Actor Sociological Survey in a Rural Region (The Argonne Region, France)" explores the complex relationship between society and the environment, using the tick issue as a case study. This paper underscores the importance of local perspectives and personal responsibility in addressing environmental health issues. It highlights how localized, participatory approaches can lead to more effective and sustainable environmental management. This theme connects with the broader discussions on sustainability and public engagement, emphasizing the need for inclusive and community-based governance practices.

10. Resilience and Institutional Capacities

"Local Governments Facing Turbulence: Robust Governance and Institutional Capacities" focuses on the resilience of local governments in times of crisis. This paper argues that adaptive governance structures and robust institutional capacities are vital for maintaining stability and continuity in public services. This study's findings are particularly relevant to the challenges of implementing artificial intelligence, ensuring cybersecurity, and building public trust, illustrating the importance of resilient governance frameworks in navigating contemporary challenges.

11. Governance Networks in Centralized Countries

"The Inner Functioning of Local Governance Networks in Centralized Countries: A 'Brave New World'?" examines the dynamics of governance networks within centralized states. This paper reveals how local governance can balance autonomy and centralization, which is crucial for understanding the broader governance frameworks discussed in other papers, such as those on artificial intelligence, digital judicial services, and cybersecurity. Effective governance networks are essential for coordinating complex policy areas and ensuring coherent and integrated service delivery.

12. Public Trust During Pandemics

"Public Trust in the Time of Pandemic: An Analysis of Social Networks in the Discourse of Large-Scale Social Restrictions in Indonesia" analyses how public trust is maintained during crises, particularly through social media discourse. This paper highlights the importance of transparent communication and trust-building in ensuring public compliance with large-scale social restrictions. The themes of trust and transparent communication are echoed across other studies, underscoring their critical role in effective crisis management and governance.

13. Sustainable Bio-Waste Management

"Advancing Sustainable Bio-Waste Management through Law and Policy: How Co-Creation Can Help Pursue Fair Environmental Public Policies in the European Context" advocates for collaborative approaches to policymaking in bio-waste management. This paper connects to the broader theme of sustainability and the need for inclusive and participatory governance frameworks. Co-creation, involving multiple stakeholders in the policymaking process, ensures that environmental policies are fair, effective, and widely accepted. This approach resonates with discussions on societal engagement and local perspectives in environmental management.

14. Deepening the Interconnection of the Themes of the Articles

i. Building Trust: The Foundation for Effective Citizen Engagement and Sustainable Development

The cornerstone of any effective local governance system is trust between citizens and their representatives. Papers 2, 5, and 10 illuminate the crucial role of citizen engagement in building trust, a prerequisite for sustainable development. Paper 2 examines how municipalities can leverage online platforms like Facebook to foster citizen participation. By examining best practices, it highlights the potential of technology to bridge the gap between citizens and decision-making processes. However, the success of such initiatives hinges on responsible data management practices and ensuring inclusivity, so that all voices, regardless of digital literacy, are heard. Similarly, Paper 10, through an analysis of social networks in Indonesia during a pandemic, demonstrates how digital tools can be harnessed to maintain public trust in times of crisis. By fostering open communication channels and transparent decision-making processes, local authorities can build trust and encourage citizen buy-in in critical public health measures. This trust, however, extends beyond the realm of digital engagement. Paper 5 ventures beyond national borders to explore the crucial link between trust, corruption, and tax compliance in fragile states across Africa. Building a culture of trust in governance emerges as a central pillar for Africa, or any developing nation, to achieve sustainable development and global prominence. Without public trust, essential government services will remain underfunded, hindering progress in critical areas like education, healthcare, and infrastructure development.

ii. The Double-Edged Sword of Technology: Opportunity, Ethical Considerations, and Building Robust Governance Frameworks

Technology presents a double-edged sword to local governance. Paper 3 explores the potential of digital access to bridge the justice gap in the Brazilian Amazon. This study exemplifies how technology can democratize access to essential services, fostering a more just society. Imagine a scenario where remote communities in the Amazon can access legal consultations or file court documents online, reducing travel burdens and increasing access to justice. However, such advancements require robust digital infrastructure and investment in digital literacy programs to ensure equitable access. Paper 4 cautions that the implementation of artificial intelligence in public administration, particularly within smart city initiatives, raises ethical and legal concerns. As local authorities navigate the frontier of technological innovation, responsible implementation is paramount. Balancing the potential benefits of artificial intelligence, such as improved traffic management or optimized waste collection, with the need for responsible data management, robust ethical frameworks, and transparent algorithms is crucial. Furthermore, Papers 6 and 8 highlight the need for strong governance frameworks at the local level to effectively harness the power of technology and navigate the complex challenges of the digital age. Paper 6 analyses the factors influencing the implementation of cybersecurity laws in Pakistan, emphasizing the importance of institutional capacity. Robust legal frameworks and well-trained personnel are essential for safeguarding critical infrastructure and citizen data in the face of cyberattacks. Similarly, Paper 8 examines the capabilities that local governments need to weather turbulent times, such as pandemics or economic crises. This highlights the need for robust governance structures at the local level to foster resilience and effective response mechanisms, which may involve leveraging technology for contact tracing during a pandemic or deploying AI-powered tools for disaster preparedness.

iii. Empowering Communities: Collaboration, Co-Creation, and Addressing Localized Challenges

Effective local governance hinges not only on citizen trust but also on empowered communities. Paper 7, which explores the multifaceted issue of ticks in rural France, underscores the importance of localized perspectives and multi-actor collaboration in tackling societal challenges. Citizen engagement strengthens governance while fostering a

sense of ownership and empowering communities to co-create solutions. This study on ticks exemplifies how a seemingly localized issue can have broader implications for public health and the environment. By involving local communities, researchers, and public health officials in a multi-actor collaboration, a more effective and sustainable solution can be developed to address the tick problem. This principle of co-creation extends to Paper 11, which focuses on sustainable bio-waste management in Europe. This study emphasizes the potential of co-creation, where citizens and policymakers collaborate to develop fairer and more effective environmental policies. Imagine citizens participating in workshops to brainstorm solutions for reducing food waste or developing innovative composting programs. Such collaborative approaches can lead to more effective and socially accepted environmental policies.

iv. Understanding Network Dynamics and Addressing Centralization: Navigating a Complex Landscape

The internal dynamics of local governance networks are further explored in Papers 8 and 9. Paper 8 examines the capabilities that local governments need to weather turbulent times, such as pandemics or economic crises. This highlights the need for robust governance structures at the local level to foster resilience and effective response mechanisms. Paper 9 delves into the inner workings of local governance networks in centralized countries. By prompting reflections on these networks' effectiveness in facilitating responsive and inclusive governance, this study underscores the importance of finding a balance between central oversight and local autonomy. Building on the findings of Paper 6 on cybersecurity, Paper 9 finds that effective local governance networks require not only strong legal frameworks but also robust communication channels between different actors. Imagine a scenario where local authorities collaborate with national cybersecurity agencies to share best practices and develop coordinated responses to cyber threats. Such collaboration strengthens the overall network and enhances its ability to protect critical infrastructure and citizen data. However, the effectiveness of local governance networks can also be hampered by excessive centralization, as explored in Paper 9. While some level of central oversight is necessary to ensure compliance with national regulations and facilitate resource allocation, overly centralized structures can stifle local innovation and responsiveness. Finding the right balance is crucial for empowering local authorities to address the specific needs and challenges of their communities.

v. Adaptive Governance and Collaborative Networks

The papers collectively advocate for adaptive governance frameworks that can respond to local contexts, harness technological advancements, and build trust through transparency and engagement. The studies on SEZs in Laos (Paper 1), digital governance in Brazil (Paper 3), and AI in smart cities (Paper 4) all highlight the need for governance models that are not only innovative but also sensitive to the socio-political and cultural landscapes they operate within. Furthermore, the discussions on network governance (Paper 9), resilience in local governments (Paper 8), and public trust (Paper 10) suggest that collaboration across various governance levels and sectors is essential for addressing complex challenges like pandemics, economic instability, and environmental degradation. These papers underscore the importance of building robust governance networks that can support local administrations in navigating crises and promoting sustainable development.

vi. The Path Forward: Fostering Innovation and Collaborative Governance for a Sustainable Future

These eleven articles illustrate the complex and multifaceted nature of contemporary local governance. The studies underscore the critical need for local authorities to undertake the following:

(a) Prioritize citizen trust and engagement by leveraging technology responsibly, fostering open communication channels, and ensuring inclusive participation, both online and offline;

(b) Embrace responsible technological innovation while addressing ethical considerations, ensuring data security, and investing in digital literacy programs;
(c) Strengthen governance frameworks at the local level to build capacity, resilience, and effective legal frameworks, particularly in the digital realm;
(d) Empower communities through collaboration and co-creation to develop effective solutions that address localized challenges and promote environmental sustainability;
(e) Navigate the complexities of local governance networks by fostering communication and collaboration between different actors, while advocating for a balance between central oversight and local autonomy.

By fostering a culture of innovation and collaborative governance, local authorities can effectively address contemporary challenges and pave the way for a more just, sustainable, and prosperous future for all. We invite the reader to engage with these studies and contribute to the ongoing dialogue on how local governance can best serve its citizens and build a brighter future.

15. A Call for Continued Exploration and Building a Stronger Network

This special edition serves as a springboard for further exploration. We encourage research into innovative approaches that empower local governments to fulfil their vital role. Here are some key areas for future investigation:

(a) Citizen Science Initiatives: Citizen science initiatives, where volunteers collect and analyse data, can be leveraged to address local environmental challenges or improve public service delivery.
(b) Big Data and Local Decision-Making: Local authorities can ethically utilize big data to gain valuable insights and inform evidence-based policy decisions.
(c) Cross-Sectoral Collaboration: Local governments can foster effective collaboration between different sectors, such as public health, education, and the private sector, to address pressing societal challenges.

16. Conclusions

By collectively addressing the issues examined in this special edition, we can strengthen the web of local governance and ensure that it serves as a powerful force for positive change in our communities. A more robust and innovative local governance system is essential for building a future where wellbeing and sustainability are not just aspirations but achievable realities for all.

The interconnected themes of digital innovation, trust, and sustainability weave through these eleven papers, providing a comprehensive framework for understanding contemporary local governance. By integrating best practices in digital engagement, addressing the legal and ethical challenges of artificial intelligence, building trust through transparency, and promoting sustainable practices, local governments can enhance public wellbeing and resilience. These studies collectively highlight the importance of adaptive, inclusive, and participatory governance frameworks in addressing the multifaceted challenges of our time. This special edition offers valuable insights for policymakers, practitioners, and researchers dedicated to advancing effective and inclusive local governance in an increasingly complex world.

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Article

Public Trust in the Time of Pandemic: An Analysis of Social Networks in the Discourse of Large-Scale Social Restrictions in Indonesia

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Abstract: This article discusses public trust in the Indonesian government's response to the COVID-19 pandemic, explicitly focusing on the discourse surrounding large-scale social restrictions (LSSR). In a time of uncertainty, the public requires timely and actual information, most of which is gathered through online media, with Twitter being one such medium. This article applies social network analysis to examine how information about the restrictions is shared and discussed on social media platforms and how this discourse may impact public trust in government institutions in the first phase of pandemic handling. Although LSSR is the government's policy, this study shows that the interpersonal network plays a more significant part in distributing information, indicating a legitimacy crisis of formal and authoritative sources of information. The negative sentiment voiced by critics did not show public rejection of the implementation of LSSR. On the contrary, what was implied by those critics was public doubt against the consistency and firmness of LSSR implementation—because of this, restoring public trust requires planned information management to communicate risks to those who are affected by LSSR implementation, as well as managing negative sentiments that arise as a response.

Keywords: pandemic; social network analysis; trust

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1. Introduction

The coronavirus disease, or COVID-19, became a trending topic that was most talked about at the beginning of 2020 and continues today as the post-pandemic discourse emerges in online and offline conversations. Conversations on COVID-19 in social media cover broader issues such as anxiety; government response; social and economic effects of the social distancing policy; hoaxes regarding the source of coronavirus, to the point of doubting the existence of coronavirus and asking whether the virus is part of a conspiracy scheme; and debate on the efficacy of vaccination (The Guardian 2020). This diversity shows how COVID-19 has affected all dimensions of human life in various parts of the world.

COVID-19 is a public issue at a global level, the handling of which is not enough to confine it within a particular country's territorial borders, thanks to its rapid transmission pattern. The world has gone through various plagues caused by viruses such as HIV, H1N1, SARS, MERS, and Ebola, but COVID-19 has a different character than those viruses, so many countries do not have adequate preparation to respond to the spread of COVID-19. In coming times, along with social and economic dynamics, risks of pandemics are estimated to be possible. Implementing physical distancing to limit the virus's spread reinforces the public's tendency to use global social networks such as Facebook or Twitter to facilitate human interaction and share information regarding the virus (Ali et al. 2019; Oh et al. 2020; Westerman et al. 2014). On the other hand, the prevalence of hoaxes amidst uncertain times, and the information overload in social media, can weaken responses against the virus and even sow public distrust against the government (Garrett 2020; Jang and Baek 2019).

Governments are expected to swiftly formulate and implement policies that can respond to the dynamics of the developing situation in various impacted sectors. This effort will be effective only if there is public support to obey protocols and policies that have been implemented, which calls for a relevant communication style amidst this pandemic. The concept of legitimacy has shifted in the context of the distribution and reception of messages through social media platforms (Limaye et al. 2020). The public tends to believe information from their relationship circle instead of authoritative sources, including the government or other formal institutions. This pattern differs from the traditional pattern, with exceptional knowledge and accountability mechanisms to guarantee that the spread of information is verified (Eysenbach 2007). In the context of the COVID-19 pandemic, the first model of information legitimacy is more robust, along with the increased public need for timely and actual information. This tendency became a crucial link for government actions which will determine the effectiveness of the COVID-19 response, since implementing health protocol alone is not enough; also required are efforts to build public trust in the effectiveness of policies that are made.

Indonesia is a country with the fourth-largest population in the world, and is predicted to be one of the countries that will face a significant impact from COVID-19 for a prolonged time, compared with other countries with less population than Indonesia (Djalante et al. 2020). Since the official announcement on 2 March 2020, the total number of positive cases of COVID-19 has reached 6,735,451, with 6,570,963 recovered, 160,905 dead, and 900 suspects (https://covid19.go.id/id/artikel/2023/02/25/situasi-covid-19-di-indonesia-update-25-februari-2023s, accessed on 25 February 2023). The total number of positive cases still shows an upward trend, even though the government launched a COVID-19 vaccination program in 2021. One of the initial efforts made by the Indonesian government in limiting the spread of the COVID-19 virus was imposing restrictions on mobility through the Pembatasan Sosial Berskala Besar (PSBB) policy, for further reference in this article translated to Large-Scale Social Restrictions (LSSR).

This mobility restriction policy was chosen to show how public trust in the government was formed during the initial period of handling the COVID-19 pandemic. The debate on regional quarantines is not confined to Indonesia since it is also found in other countries. In the global conversation sphere, the lockdown issue is faced with herd immunity (Jenkins 2020). The timing of restrictions in each country has varied. Various countries such as Spain, Austria, Italy, China, Germany, and the United States, that implemented lockdowns through suppressive or less coercive mitigation policies, have improved their condition so that these countries have relaxed their lockdowns. Herd immunity is letting the virus spread, intending to build individual immunities so they may fight off the virus. The debate between lockdown and herd immunity grew after the lockdown was enacted, while in the early phase before the implementation of the lockdown such debate did not exist. The condition differs in Indonesia, where the debate on the need for regional quarantine was initiated as a public demand.

The implementation of LSSR is a case in which the public, through discussions on online media, encouraged the government to enact concrete policies to limit the spread of the COVID-19 virus after the first case was officially recognized. Initially, the central government rejected the implementation of the lockdown because of fears it would have an impact on slowing economic activity. LSSR implementation started with the local government closing schools and public places. After local governments took similar steps in big cities in Indonesia, such as Jakarta, West Java, Banten, and Central Java, the President issued regulation named Government Regulation Number 21, established in 2020, which became the legal basis for LSSR. Through this legal basis, local governments limited the movement of people and goods in and out of their respective areas after obtaining permission from the relevant ministries, in this case, the Ministry of Health.

After launching the policy in April 2020, conversations in the Indonesian online media show exciting dynamics. From February 2020 until May 2020, conversations regarding COVID-19 were filled with debates on the issues of the use of masks, the implementation

of lockdown, LSSR, and the effectiveness of policies, as well as government programs to handle the economic and social repercussions of COVID-19. The debate on enacting regional quarantine is one of the issues that attracted a large amount of attention. API Twitter data processing shows that the lockdown issue attracted engagements from 12,147 tweets from 5 April 2020 to 14 May 2020 (https://academic.droneemprit.id/#/search/view/analysis/media/id/848, accessed on 14 May 2020), while 268,792 tweets followed the conversation on LSSR over the same period (https://academic.droneemprit.id/#/search/view/analysis/media/id/849, accessed on 14 May 2020).

Twitter API tracing found a tweet from the account @KawalCOVID19 on 28 March 2020 as one of the accounts that initiated the discussion on lockdown through its thread regarding the urgency of regional quarantine (https://twitter.com/KawalCOVID19/status/1243920510628425729, accessed on 12 May 2020). This tweet was aimed at the account @Jokowi, the personal account of President Joko Widodo, and also several other personal accounts of regional leaders in Java, that is, the accounts of Anies Baswedan (governor of DKI Jakarta), Ridwan Kamil (governor of West Java), Ganjar Pranowo (governor of Central Java), and Khofifah Indar Parawansa (governor of East Java). Since posting for the first time, this tweet has been retweeted 6397 times and liked 5860 times. This tweet garnered the most engagement in the discussion regarding the lockdown in Indonesia. The account @KawalCOVID19 is an account that civilian volunteers manage that is composed of medical professionals who aim to serve updates on COVID-19 data (https://twitter.com/KawalCOVID19, accessed on 12 May 2020).

The discussion on lockdown subsided and shifted to the issue of LSSR when the government officially permitted the governor of DKI Jakarta to enact LSSR to limit the spread of coronavirus. The same decision was also given to the governor of West Java and other regions with a high rate of COVID-19 cases. Since the beginning of April 2020, online discussions have been filled with discussions on implementing LSSR. The initial momentum came from the enactment of *Keputusan Presiden Nomor 11 Tahun 2020* (Presidential Decree Number 11, established in 2020), which established a state of public health emergency concerning coronavirus in Indonesia, which was later followed by the enactment of *Peraturan Pemerintah Nomor 21 Tahun 2020* (Government Regulation Number 21, established in 2020) that governs the implementation of LSSR in facing COVID-19. Even though the reiterations of government positions facing COVID-19 were made through these regulations, online debates concerning the effectiveness of LSSR did not subside. These debates are fascinating to observe since the discussions cover the health and political perspectives, especially concerning the government's capacity to handle the virus's spread and the social restrictions' other effects. The issue of government capacity not only filled online discussions in Indonesia but in other countries facing the same issue during a pandemic (Maxwell 2003; You et al. 2017). This means the public's interest is not only related to their health, but also to the social dimension management that arose out of the handling of the virus, that required government authority in its decision-making.

This study highlights how the dynamics of conversations on Twitter can be a force to encourage governments to take concrete steps to limit people's movements during the early days of the pandemic. Analysis of online discussion dynamics can yield an image of the public perspective on the issue of LSSR, mainly because this issue directly impacts the public's daily lives. The enactment of LSSR will lead to individual activity restrictions in the public sphere, such as education, work, and other kinds of mobility. On a larger scale, this restriction will also result in enterprises grinding to a halt, especially in sectors that do not serve basic public needs. The handling of COVID-19 faces a dilemma between prioritizing health and prioritizing the economy because the restrictions imposed to halt infection rates negatively impact the economic sector, specifically those in the lower to middle classes (Yumna et al. 2020).

The dilemma of prioritizing health or the economy has filled public discussions, including online discussions, since the start. The social and economic effects of the handling of COVID-19 mean that this pandemic is more than just a health issue, but is also a

political issue, since there is a debate on policy options to be taken and implemented by the government. The messages sent through social media reflect public aspiration and how various sides frame the issue of LSSR. Framing has been the central power instrument to compete in introducing the meaning of a phenomenon (DeLuca et al. 2012; Paskarina and Nuraeni 2021; Pieri 2019; Wang et al. 2020). The enactment of LSSR is a government choice that attempts to bridge the differences between the need to preserve public health from virus infection on one side, and maintaining the economic sector, especially parts with a direct connection to basic needs. The option of implementing several restrictions on public activity will make way for a debate on how far such a policy could be implemented for the public interest. The effectiveness of LSSR implementation is determined by the government's ability to build public trust in the policy option that is made.

This article examines public trust in the Indonesian government's response to the COVID-19 pandemic, explicitly focusing on the discourse surrounding large-scale social restrictions during the early phase of the virus spreading (March to May 2020). During the initial phase of the spread of COVID-19, from March 2020 to mid-2021, the government did not respond quickly and thoughtfully to the spread of this virus and even showed a denial tendency and prioritization of economic concerns over public health measures (Mietzner 2023). Indonesia was once ranked the third country in the world with the most additional daily cases of COVID-19 in early July 2021 (https://www.kompas.com/tren/read/2021/07/08/073500365/menilik-posisi-kasus-covid-19-di-indonesia-dibandingkan-dengan-negara-lain?page=all, accessed on 14 May 2020). This denial response changed after entering the second phase with the emergence of the Delta variant in late 2021 (Mietzner 2023). The difference in the characteristics of the government's response between the two phases emphasizes the significance of analyzing public trust in the initial phase of handling COVID-19, to understand if the online conversation map shows the public's critical attitude towards the denial response demonstrated by the government during the early phase of the COVID-19 pandemic, particularly regarding restriction policy.

The implementation of the restriction policy is related to the state's economic and political capacity (Croissant and Hellmann 2023). Economically, implementing the restriction policy has implications for the state's ability to provide for the needs of society during restrictions, including ensuring that basic economic activities can continue. Politically, the imposition of restrictions is prone to triggering resistance, as has happened in several countries which imposed restrictions by making decisions in secret and implementing them in an authoritarian manner.

In the case of Indonesia, the discourse on imposing restrictions was initiated by community groups as a form of criticism of the government's response at the beginning of the pandemic phase, which was denial and anti-science in nature. To explain this phenomenon, this article assumes that the government's consistency determines public trust in it using its capacity to implement LSSR. The main argument is that the government's past performance in maintaining previous policies (over a significant period) is essential in maintaining public trust (van Engen et al. 2019) and even more critical in facing the denial response indicated in the early phase of the pandemic handling in Indonesia.

This study builds an argument base on Croissant and Hellmann's (Croissant and Hellmann 2023) conceptual framework regarding state capacity and public response to policies taken by the government. State capacity, typically defined as the ability of the state to achieve its objectives (Acemoglu and Robinson 2019), has been linked to numerous factors, including positive pandemic outcomes (Serikbayeva et al. 2021). However, this article focuses on the government's consistency in using its capacity during a pandemic. This consistency will be reviewed from public online talks during the initial phase of handling COVID-19 in Indonesia, especially to see whether the denial and anti-science response the government initially showed has changed after the netizens encouraged the government to establish an LSSR policy.

To examine the argument, this article uses social network analysis to map the relation of LSSR issues with other topics of public concern, such as who is most associated by the public with this issue, and what the prevailing sentiment is. The analysis of maps of discussion and social networks that produced such meaning will show how the LSSR issue is politicized, in the sense of how its meaning is contested in a time of pandemic to build public trust.

2. Materials and Methods

This article considers text as a product representing power relations in Twitter discussions. It is crucial to identify the kind of text that appears in online discussions to identify the underlying power or interest that shaped the arguments behind such text. For this reason, this article uses a social network analysis approach that analyses big data of public discussions on implementing LSSR from Twitter API.

The data was acquired online through Twitter data mining using the Drone Emprit Analysis platform from 10 April 2020 to 10 May 2020. The keywords used are "*Pembatasan Sosial Berskala Besar*" (Large-Scale Social Restrictions) and "PSBB" (LSSR). Both terms are selected since they are the official names of government policies, and the selected tweets should come from Indonesia. This period was selected since 10 April 2020, was when LSSR was first implemented in Indonesia, which is in the Province of DKI Jakarta, the capital city of Indonesia (https://www.cnnindonesia.com/nasional/20200417074310-20-494387/daftar-daerah-yang-disetujui-dan-belum-boleh-terapkan-psbb, accessed on 14 May 2020).

Data collection shows that there are 222,736 tweets. From that aggregate, data processing was done through an application provided by the Drone Emprit Academic social media monitoring platform (academic.droneemprit.id). Data processing results from online discussion interaction imaging, sentiment analysis, and emotional analysis were used to analyze discussion characters concerning LSSR implementation. These data were then analyzed to explain how the public relates the LSSR implementation issue with other topics that took public attention. Social network analysis data processing was done with the same platform to identify actors associated with LSSR implementation issues and relations among said actors. The results of interpreting such data were analyzed to elaborate on the potentialities of politicizing the LSSR issue.

3. Results

The discussion trend regarding LSSR shows a high engagement from the public since the policy was first enacted in DKI Jakarta, the province with the highest number of positive COVID-19 cases in Indonesia. The following figure shows the engagement dynamics throughout data collection, covering interactions in mentions, retweets, and replies. The data shows that LSSR implementation is an issue that is regarded as necessary since there is daily information or mentions in regards to LSSR, as well as public response in the forms of retweets or hashtags that are related to LSSR. The tendency of response to come in the form of retweets to continue the messages shows that the messages contain essential meaning for the public or have informative value, so that there is relevance between the messages and public needs.

The trend in Figure 1 shows a fluctuating dynamic, with several high points recorded on 11 April 2020, 5 May 2020, and 8 May 2020.

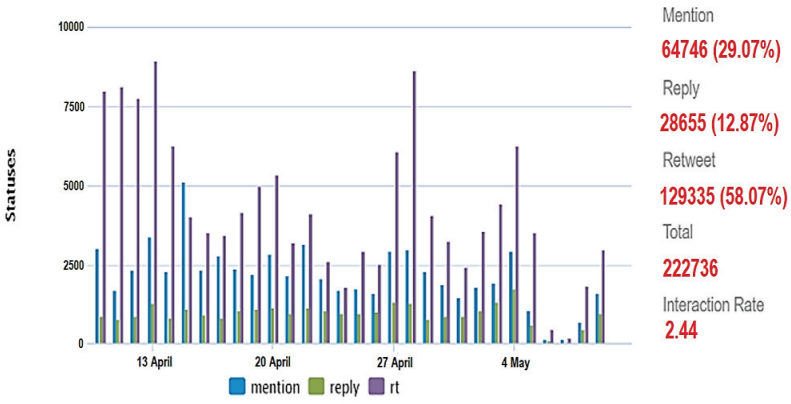

Figure 1. Dynamics of discussions on LSSR.

Figure 2 shows that the trend in sentiment indicates an almost balanced response between positive (50 percent) and negative (44 percent) responses. The Figure 3 below shows that negative responses rose several times, exceeding positive and neutral responses, that is, on 13 April 2020 (6504 negative mentions), 28 April 2020 (7497 negative mentions), and 4 May 2020 (5708 negative mentions). Such statements with a negative tone contain the public's criticism of the weakness of LSSR enforcement throughout the implementation of LSSR and doubts about the effectiveness of LSSR implementation.

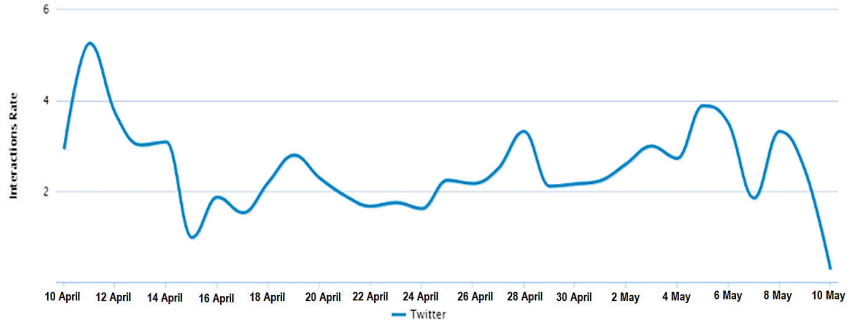

Figure 2. Trends in discussions about LSSR.

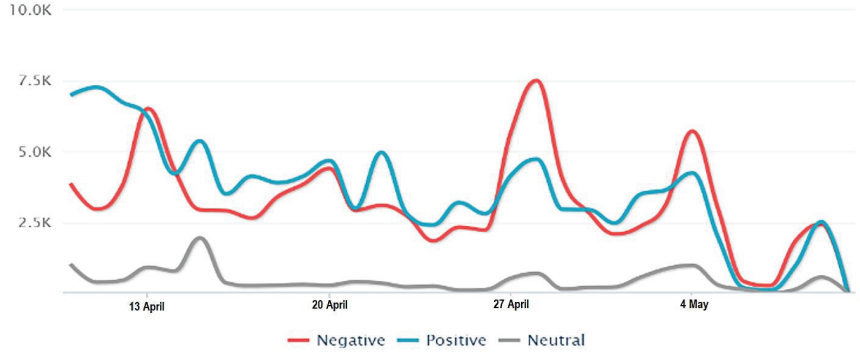

Figure 3. Trends on sentiments in discussions on LSSR.

The tendency of negative responses that continue to fill discussions on Twitter for a month since the enactment of LSSR is confirmed in the analysis of public emotion tendency reflected in posted tweets. Figure 4 shows the highest tendency in statements containing anticipatory messages (3017 mentions). Anticipatory messages contain statements on the government's efforts in LSSR implementation or situation updates, which are mainly informative. Data also showed that statements that reflect trust and anger also rank high.

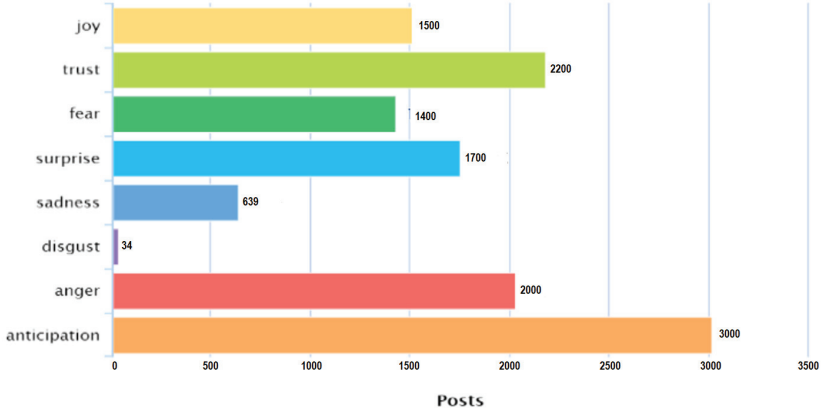

Figure 4. Emotional analysis of discussions on LSSR.

The following data processing was done to identify social networks within the dynamics of discussions on LSSR implementation. Based on the data above, several crucial momentums that mark specific responses were identified. This data was then cross-checked with actual dates connected to the implementation of LSSR. This policy was not enacted simultaneously in all regions in Indonesia but differs according to authorization messages from the Indonesian Ministry of Health. Momentum cross-checks from these online and real-life discussions were used to understand the context that made way for specific discussion dynamics, including the mobilization of social networks in such dynamics.

Social network analysis results first served as the social dynamics on 10 April 2020, the first day of LSSR implementation in Jakarta, the capital of Indonesia, and the region with the highest number of COVID-19 cases in Indonesia.

Figure 5 shows that all accounts responded positively to implementing LSSR in Jakarta (marked green in the social network analysis map). Three accounts stood out in the discussion dynamics. The accounts @CNNIndonesia and @DKIJakarta had close and even intersecting positions, ultimately indicating that both accounts were interrelated in providing information on LSSR. The account @CNNIndonesia is a media account, while @DKIJakarta is the official account of the DKI Jakarta Provincial Government. The interrelation between the two showed the role of information arbitrage taken up by media accounts in providing information from the government. In the lower-left section, there are other media under the account @nuicemedia, which despite its rather significant role, is separated from the others. This was caused by the fact that this account provided information in English, which reached out to a different audience than other accounts, which tended to gravitate towards the DKI Jakarta Government account.

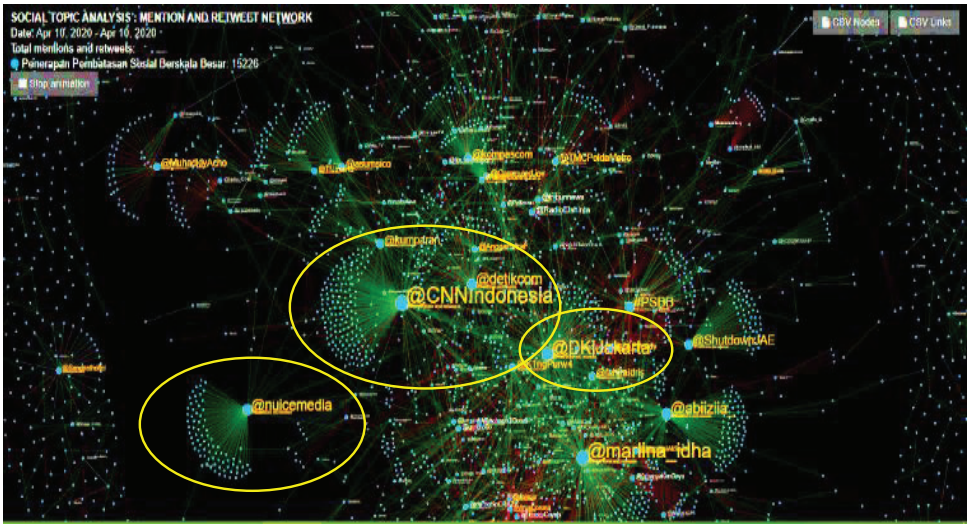

Figure 5. Social network analysis on the first day of LSSR on 10 April 2020; the condition was recorded at 11:59 p.m.

The following social network analysis map is regarding 13 April 2020, marked by many tweets with negative sentiments. The negative sentiments that gained strength in Twitter discussions were triggered by tweets from the account @ainunnajib that contained criticism against the Health Minister who refused to give authorization for the Palangkaraya Municipal Government to enact LSSR, reasoning that COVID-19 had not reached a critical level in Palangkaraya, even though the purpose of LSSR is to control infection so that there would not be a critical level (https://twitter.com/ainunnajib/status/1249490191074471936, accessed on 18 May 2020). This tweet is coupled with the corresponding document from the Minister of Health. Since being posted at 07:30 a.m., this tweet garnered an increasing engagement which peaked at 11:59 a.m., as seen in the Figure 6.

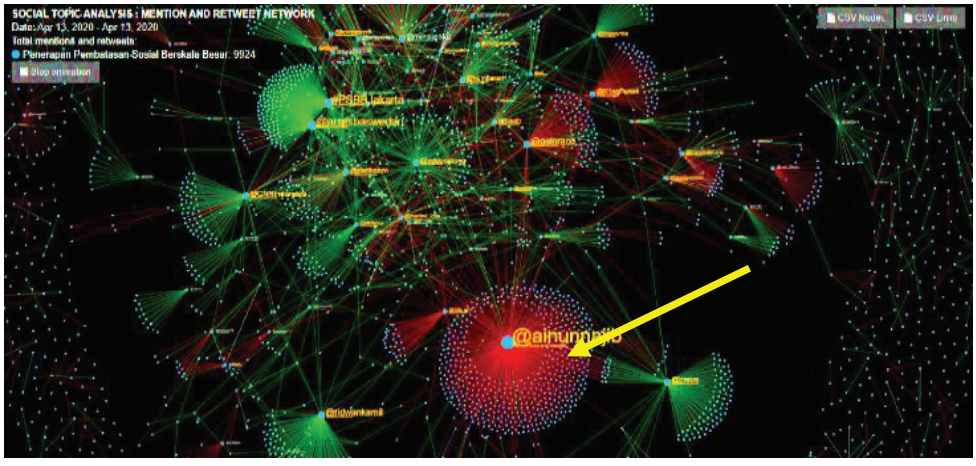

Figure 6. Social Network Analysis on 13 April 2020; the condition was recorded at 11:59 a.m.

Discussion surveillance data on 28 April 2020 captured heightened negative sentiments, which peaked at 10:59 a.m. The social network analysis mapping figure showed that on that day, at least three interconnected clusters voiced discussions with negative tones, with the account @rasjawa as the epicenter (Figure 7). Messages posted by this account were then voiced again by the accounts @fadlizon and @tempo.com. Only one account managed to create a cluster with a positive tone (@e100s), but other accounts did not echo it. The account @rasjawa posted narratives on his experience witnessing a man riding a motorbike with his child who was stopped by police for violating LSSR in Bandung (https://twitter.com/rasjawa/status/1254674390467268608, accessed on 19 May 2020). The implementation of LSSR in Bandung forbade motorcyclists to carry passengers, which led to the man's child being ordered to get off the motorbike and switch to a means of public transport along with other passengers whom the child did not know. The account @rasjawa criticized Bandung LSSR regulations for being illogical. This statement garnered a significant response from the public, as seen in the following social network analysis mapping.

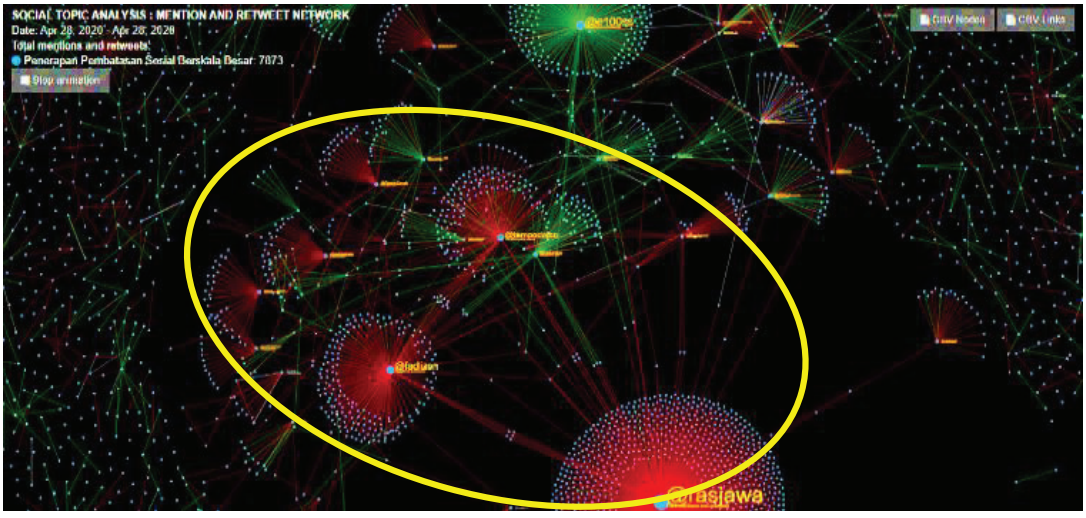

Figure 7. Social Network Analysis on 28 April 2020; the condition was recorded at 10:59 a.m.

Statements with negative sentiments exceeded positive statements again on 4 May 2020. On this day, it was recorded that negative sentiments appeared more than 5710 times, slightly higher than positive sentiments with 4237 appearances. In the following social network analysis mapping (Figure 8), the positive sentiment cluster can be seen to be dominated by the account @ridwankamil, which stood at the center of the discussion, while other accounts which sent negative sentiments are spread across several clusters, among those which stood up was @wanderstruck and other accounts which were spread in the lower-right section.

These negative sentiments accounts did not show an interrelation with one another, indicating that their messages were different but contained negative sentiments equally. For example, the account @wanderstruck posted a message with information on the condition of Semarang Zoo, which had difficulties being in a Red Zone that implemented LSSR, resulting in difficulties for feeding the zoo animals after the closing of the zoo during LSSR (https://twitter.com/wanderstruck__/status/1257080327249342464, accessed on 19 May 2020). Several other accounts with negative tones contained other messages, such as criticism of political figures who used LSSR as a pretext to avoid investigations by the police. Overall, the messages with negative tones were not related to each other but garnered a

high engagement which exceeded the number of positive sentiments whose contents were directly related to the implementation of LSSR.

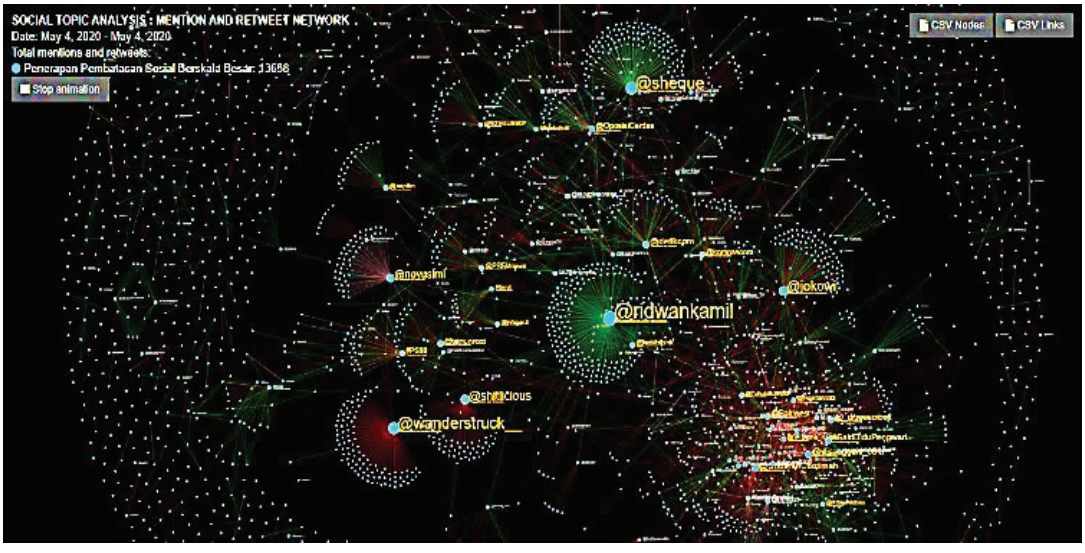

Figure 8. Social Network Analysis on 4 May 2020; the condition was recorded at 11:59 p.m.

The account @ridwankamil, which created a rather large cluster at the center of the discussion, posted a status that contained information on pickup services from the West Java government for West Java residents then waiting in Saudi Arabia. These West Java residents then underwent a period of isolation per COVID-19 health protocol (https://twitter.com/ridwankamil/status/1257207671981248513, accessed on 19 May 2020). The account of @ridwankamil is the personal account of the West Java governor, who is regularly active on Twitter, not only during the duration of the COVID-19 pandemic.

The social network analysis data provided in the Figure 8 above showed several findings that will be elaborated further in the following discussion section.

4. Discussion

This article seeks to discuss whether the dynamics of discussions on Twitter on LSSR implementation reflect public trust in implementing such a policy. By identifying momentum referent points that generated extremely negative responses, social network analysis data from the previous section showed several essential findings, which are:

First, social network analysis maps show that discussion clusters are sporadic, with no account dominating discussion topics. This indicated that discussion dynamics were not planned to be organized as a channel for delivering information or socialization on the details of LSSR policies. This is also supported by official government accounts that were not actively providing information. Several accounts related to governments and that played an active role were @jokowi, @ridwankamil, and @ganjarpranowo. The exception applied for DKI Jakarta, in which the account @DKIJakarta and the account @aniesbaswedan were both active in providing information on LSSR. Communication models through these personal accounts are effective enough to create closer relations between the public and their leader but risk being "attacked" by anonymous accounts that dislike the leader figure. This model also shows that during a pandemic, interpersonal information networks play a more significant part (Bennett and Segerberg 2012; Jang and Baek 2019). On the other hand, information distribution through interpersonal networks is vulnerable to misinformation and hoaxes, which are counterproductive to the government's interest in building public

trust through objective information on COVID-19. Online media accounts are also considered to play an active role in discussion engagement, especially in information arbitrage or connecting information from the government to the public.

Second, regional leaders' accounts play a more active role in delivering information, as seen from the character of the messages, which tended to be anticipatory. Conversely, the accounts representing national figures or government institutions, though playing a role, more often rely on traditional media or online media as a channel to funnel information, as indicated by the mass media engagement model that played a part in information arbitrage. The local government played a more significant role in LSSR implementation since, technically, these policies were implemented by the local governments. Nevertheless, government messages seemed to lack coordination when addressing a complaint, or public reports on regulations between the implementation of LSSR in regions, or even differences of interpretation on LSSR implementation in inter-regional relations such as in transport matters. This became an issue because it created public confusion, which questions which message to trust, ultimately allowing the public to determine their attitudes even if they violate LSSR regulations (Limaye et al. 2020).

Third, official accounts from government institutions did not seem to be involved in the discussions, primarily when negative sentiments increased in numbers. No efforts were seen from the official government accounts to respond to the negative sentiments from statements containing criticism or public reports on LSSR violations. This is seen from social network analysis mapping that illustrates that negative clusters, large or small, did not interact with positive clusters. In a deeper analysis, the government did respond to critics, for example, to the messages from the account @rasjawa. However, the clarificatory response from the government on the reason for the prohibition of a motorcyclist from carrying passengers (though family members) did not invite engagements from other accounts that retweeted the clarificatory statement. This reinforces the assumption of a public legitimacy crisis on formal and authoritative sources of information (Eysenbach 2007; Limaye et al. 2020).

Fourth, negative sentiments arose out of ambiguity in implementing LSSR or for illogical regulations. The ambiguity in LSSR implementation is seen in examples such as critics of the government's neglect of those who still gather in crowds, do not use masks, or violate other LSSR regulations. Additional examples criticized illogical regulations, for example, those aimed at implementing LSSR for motorcyclists who are barred from carrying passengers, including family members. Critics against the process of LSSR authorization by the Ministry of Health also arose as a form of doubting the government policies, exceptionally when the government did not authorize LSSR permissions. Such negative sentiments that were voiced in the form of critics did not show public rejection against LSSR implementation, but on the contrary, it showed public doubt in government consistency and assertiveness in implementing LSSR. The debate on a lockdown or regional quarantine, as pictured in the early stages of the discourse, did not continue when the government opted to implement LSSR. This indicates public support for the government policy, but the public's critical stance will continue arising when the implementation of this policy is deemed inconsistent, lacking coordination, and lenient in punishing those who violate the policy. The pandemic situation on its own has brought about uncertainty, including the uncertainty of how long LSSR will last, so that in this situation the government needs to provide a guarantee to the public that each policy that is taken will lead the public out from the state of crisis (Chen et al. 2020).

Fifth, positive messages that invite many engagements have a particular character that could be reproduced and echoed on a larger scale to build public trust. Such a character is actionable information, which means that sent messages should be able to be used as a guide to anticipate situational developments so that the public can prepare themselves in the middle of uncertainty (Gerwin 2012). Dynamic analysis data from Twitter conversation dynamics confirmed this, mainly covering anticipatory measures (more than 3000 tweets). Messages with actionable information also include health recommendations, which are

also required by the public to maintain their health (Murthy 2013), as well as opening space for the public to participate in self-regulating and limiting interaction with others as part of supporting LSSR implementation. Official government accounts, be that on the local or national level, including personal accounts of government leaders or regional leaders, need to provide more messages containing actionable information to direct public behavior in accordance to health protocols and LSSR regulations.

5. Conclusions

In building public trust in the government during a pandemic, social media conversation, including Twitter, holds strategic importance, for it can be used to provide information on the developments of pandemic handling so that the public can avoid being left in a state of uncertainty. Efforts to build trust relate to communicating risks to the public affected by implementing LSSR and controlling negative sentiments that arise responsively. Analysis of the social network analysis mapping results showed that the public holds LSSR-related information in high regard, which is marked by the high number of engagements in discussions on this issue. Nevertheless, such enthusiasm is not balanced by the government accounts' capacity to manage communications. The solid interpersonal networks in information distribution reinforce such an assumption.

The affirmation will reflect public trust in disseminated information concerning LSSR. The high tendency of negative sentiments in LSSR-related discussions shows a low level of public legitimacy on informative messages sent by the government, since the public noticed a contradiction between LSSR regulations and their implementation. Such a level of negative sentiment is not due to the public's rejection of LSSR, but to public doubt in the effectiveness of LSSR implementation. This public doubt can be managed through disseminating counter-information on the results of LSSR, such as providing data on cases during the implementation of LSSR. Public trust must be built through legitimacy born from a deliberation process with logical argumentation, not an affiliation to a particular figure.

During the pandemic, the government must promptly communicate the crisis effectively and efficiently to the public since failure will spread fear, anxiety, and uncertainty to the people. With the scale and reach of the pandemic, which is spreading rapidly, there is an urgent need to build communication practices to disseminate the latest accurate and timely information to respond to public aspiration. The government can partner with social media to identify, fact-check, and even delete false or expired information to optimize these social networks to support COVID-19 handling.

Even though online discussions can provide an overview of public trust or distrust in the government's capacity to handle COVID-19, sentiment analysis from online discussions has limitations because the themes discussed are temporary and dynamic, resulting in the difficulty of building strong arguments as a basis for encouraging government policies that are more responsive in handling the pandemic. Therefore, to ensure the government's consistency in using its capacity in situations of uncertainty, there need to be continuous efforts from the public to criticize the government's performance by using online media and other representation institutions.

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social sciences

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Review

Advancing Sustainable Bio-Waste Management through Law and Policy: How Co-Creation Can Help Pursue Fair Environmental Public Policies in the European Context

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Abstract: Alongside production and consumption, bio-waste management is central to the food systems debate. To achieve sustainable food systems—an essential component of the Sustainable Development Goals and the world they envision—public authorities must address the shortage of current bio-waste-management policies and strive towards a new paradigm of bio-waste management, where environmental justice primarily informs policy design and decision making. In order to achieve fair environmental policies, particularly in the context of food systems and bio-waste management, it is essential to understand what drives public policy in these matters. In the present review, we seek to contribute by closing a gap in the literature by proposing a set of bio-waste-management drivers in the European context. Moreover, we focus on the "policy and legislation" driver, hoping to examine its main components and understand both their limitations and the opportunities they provide. Finally, we explore the role that co-creation can play as a facilitator of a public-governance paradigm that promotes sustainable development.

Keywords: sustainability; circular food systems; bio-waste management; co-creation; governance

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1. Introduction

There is no shortage of solutions for the sustainable management of bio-waste, such as material recovery by composting or anaerobic digestion, the go-to waste-to-energy method that transforms bio-waste into biogas, a process from which digestate is also created (Gadaleta et al. 2021).

Although the methods for the sustainable management of bio-waste—understood as the "biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises and comparable waste from food processing plants" (European Union 2008, Directive 2008/98/EC)—are well known to the scientific community and practitioners, it largely remains to be understood how to move away from more traditionally linear methods, such as landfilling and incineration—considered as such when not matched with energy recovery (Dhanya et al. 2020)—and towards more circular methods, such as composting and anaerobic digestion. Therefore, understanding which factors determine the development of bio-waste management systems (Contreras et al. 2010) is increasingly essential. We are dealing with the issue of the drivers of bio-waste management (Márquez and Rutkowski 2020), the understanding of which will allow us to act with greater confidence on bio-waste management systems.

The growing prominence of sustainability and sustainable development has drawn researchers to the theme of waste management and, in particular, to bio-waste management, the food waste portion of which is understood as an essential component of the construction of circular food systems (Jurgilevich et al. 2016). As the interest in this topic has grown, so has the attention given by researchers to the drivers of bio-waste management, as shown by the multiplication of reviews of waste-management drivers over the last decade and a

half (Agamuthu et al. 2009; Contreras et al. 2010; Márquez and Rutkowski 2020; Wilson 2007; Zaman 2013).

However, the differences between the drivers of waste management in general and bio-waste management in particular remain to be explored, with most studies focusing on waste management generally. Similarly, scientific research is lacking a unitary, comprehensive, and comparable review of drivers of bio-waste management in the European context. Hoping to provide a first step in addressing these challenges, this paper also aims to offer to deepen the understanding of the policy and legislation driver by highlighting co-creation's contribution to making bio-waste management systems more circular.

After exploring the centrality of the circular economy in the pursuit of more sustainable bio-waste management systems, this review addresses the relevance of food and circular food systems for the pursuit of a more sustainable planet, before shifting its attention to the bio-waste management component of circular food systems. We then focus our study on an analysis of the most relevant collections of waste-management drivers suggested by the literature, based on which we propose a set of bio-waste management drivers in the European context, seeking to contribute in closing a gap in the literature on the subject. After then focusing on the policy and legislation driver—examining its main components with the aim of understanding both their limitations and opportunities—we explore the role that co-creation can play as a facilitator of a public-governance paradigm that promotes sustainable development.

2. Circular Economy at the Heart of the Sustainable Development Challenge

Brought forward by the famous study, "The Limits to Growth" (Meadows et al. 1972), and defined in the Brundtland Report ("Our Common Future") as the development that allows the present generations to meet their needs without compromising the ability of future generations to meet their own (World Commission on Environment and Development 1987), sustainable development has been part of the global agenda since the Stockholm Conference in 1972. Today, the discussion of the sustainable development of the planet focuses on the Sustainable Development Goals (SDGs). As part of the 2030 Agenda, approved at the United Nations Sustainable Development Summit in 2015 (United Nations General Assembly 2015), the SDGs offer an ambitious holistic vision (Hickel 2019) of sustainable development.

Some authors find in the circular economy the answer to the challenges raised by the SDGs (Belmonte-Ureña et al. 2021; Sachs et al. 2019), which has prompted this concept to gain increasing prominence in the discussion on sustainable development, particularly in the context of industry (Uemura Silva et al. 2021; Velenturf et al. 2019) and natural resource management more broadly (Barros et al. 2020; Ingrao et al. 2018).

Diametrically opposed to the linear economy, based on the abundance of resources and the unlimited capacity to generate waste (Jurgilevich et al. 2016; Puntillo et al. 2021), the circular economy is characterized by the return of materials to the previous stages of natural or manufacturing processes, seeking to extract the greatest utility possible (and, consequently, the greatest value) from them (Östergren et al. 2014).

In other words, through a tripartite action (Esmaeilian et al. 2018), the circular economy seeks to slow down, close, and narrow the product cycle (Geissdoerfer et al. 2017), replacing the linear economy business model (take–make–consume (Ghisellini et al. 2016; Hartley et al. 2020; Merli et al. 2018) or take–make–consume–dispose (Puntillo et al. 2021) with the make–use–return model (Ellen MacArthur Foundation 2013), where profit is generated by the flow of materials over time (Puntillo et al. 2021).

In addition to having found great expression in industry (Uemura Silva et al. 2021; Velenturf et al. 2019; Winans et al. 2017), the concept of the circular economy is currently central to natural-resource-management issues (Barros et al. 2020; Ingrao et al. 2018), finding particular relevance in waste management, and, especially, in the management of bio-waste, which can be reintroduced into the food-production chain in the form of nutrients, energy, or even packaging materials (Gaspar et al. 2021).

The great prominence that the concept of the circular economy finds in natural resource management is reflected by the concept of the circular bioeconomy, which has emerged and gained increasing expression since 2015 (Stegmann et al. 2020). Despite different perspectives—compiled by Stegmann et al. (2020)—on the relationship between the concepts of the circular economy, bioeconomy, and circular bioeconomy, a circular bioeconomy seeks to "minimize the depletion of resources (. . .), prevent the loss of natural resources (. . .) and stimulate the reuse and recycling of inevitable by-products, losses or wastes" (Muscat et al. 2021, p. 561), making it easy to understand how the idea of a circular bioeconomy fits in with the pursuit of more sustainable development.

3. The Role of Bio-Waste Management in Building Circular Food Systems

In the European Union (EU), the Circular Economy Action Plan for a cleaner and more competitive Europe launched in 2020 (European Commission 2020a) constitutes one of the main pillars of the European Green Deal. The aim of the Action Plan is to "accelerate the transition to a regenerative growth model that gives back to the planet more than it takes", "reduce its consumption footprint", and "double its circular material use rate in the coming decade". Similarly, Directive 2018/851 of the European Union (2018), amending Directive 2018/98/EC, establishes in its Article 11 recycling targets, according to which by 2025, a minimum of 55% of municipal waste by weight should be recycled or prepared for reuse, a target that rises to 60% in 2030 and 65% in 2035 (Directive 2018/851). Regarding food, the Farm to Fork Strategy for a fair, healthy, and environmentally friendly food system (European Commission 2020b) states that "The circular bio-based economy is still a largely untapped potential for farmers and their cooperatives. For example, advanced bio-refineries that produce bio-fertilizers, protein feed, bioenergy, and bio-chemicals offer opportunities for the transition to a climate-neutral European economy and the creation of new jobs in primary production".

Food constitutes one of the most important sectors of the economy, accounting for 8.3% of jobs and 4.4% of GDP in Europe (Lemaire and Limbourg 2019). As they consume 79% of the food produced annually (FAO 2019), cities are the main driver of food systems (Calori et al. 2017), thus positioning themselves as an element of the utmost importance for the discussion on food sustainability.

The debate on food sustainability and cities includes the concept of a circular food system, understood by Jurgilevich et al. (2016) as one that "implies reducing the amount of waste generated in the food system, re-use of food, utilization of by-products and food waste, nutrient recycling, and changes in diet towards more diverse and more efficient food patterns" (p. 2). Distinguishable from linear food systems by their concern for reducing emissions and waste at all stages of the food system and by its environmentally responsible treatment of food waste, circular food systems involve action at three stages: production, consumption, and waste management (Jurgilevich et al. 2016).

To this end, the scientific community has focused a great deal of effort on the issue of food waste, defined by the United Nations Environment Programme (UNEP) as food and the associated inedible parts removed from the human food supply chain (to landfill, controlled combustion, sewer, litter/discards/refuse, co/anaerobic digestion, compost/aerobic digestion, or land application) in the sectors of manufacturing of food products, food and grocery retail, food service, and households (UNEP 2021).

This interest can be justified by the data released by UNEP, which indicate annual food waste of around 931 million tons in 2019 (UNEP 2021), corresponding to the waste of one-third of all the food produced globally in a year and whose use would feed two billion people (UNEP 2015). In the European Union, the most recent data indicate food waste of 59 million tons in 2020, corresponding to 131 kg per inhabitant (Eurostat 2023).

Alongside these, the renewal (both in volume and type) of food needs in developing countries (Lemaire and Limbourg 2019; Porter et al. 2016) places growing pressure on global food systems, further justifying the SDG concern with production and consumption (and food waste associated with these stages of the food system), as stated in SDG 12

(Responsible Consumption and Production) and its target 12.3 ("By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses"), as well as in target 2.4 ("By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality") of SDG 2 (Zero Hunger) (United Nations General Assembly 2017).

Despite different definitions of food waste—from those that understand food waste as the edible material that is ultimately wasted from production to consumption (FAO 1981; Gustavsson et al. 2011; Jurgilevich et al. 2016) to those that also include in their definition the inedible material that is ultimately wasted (Ladele et al. 2021; Östergren et al. 2014)—food waste constitutes a much broader set of losses than just the food itself.

The production of food that ends up wasted has significant impacts on the use of natural resources, fertilizers, and fuels (Krishnan et al. 2020; Sehnem et al. 2021), as well as those arising from water use—with Lemaire and Limbourg (2019) pointing to an expenditure of 306 cubic kilometers of water in the production of food that is eventually wasted—and from greenhouse gas emissions resulting from the landfilling of this food or its treatment in similarly environmentally inefficient ways (Gokarn and Kuthambalayan 2017; Jurgilevich et al. 2016; Sehnem et al. 2021). This set of losses, with an estimated economic impact of USD 490 billion (Esparza et al. 2020), makes food waste equivalent to the third most polluting country in the world (UNEP 2015).

Notwithstanding the importance of acting on production and consumption (and the problem of food waste underlying both these phases), it is on the third phase or element of circular food systems—bio-waste management—that we will focus for the remainder of this study.

Papargyropoulou et al. (2014) developed a food waste hierarchy and suggested that action on food waste should be preferred, in the following order: prevention, reuse, recycling, recovery, and finally, disposal. Thus, after efforts to prevent surplus food generation and food waste generation, the focus of food waste management policy should shift to the reuse of excess food produced, namely through surplus food distribution (Garrone et al. 2014). For undistributed food and food rendered inedible, the food waste hierarchy suggests its conversion into animal feed (Esparza et al. 2020) or its composting.

A succeeding option to composting—and in opposition to the understanding that the choice of methodology to be used in food waste management should be dependent on an analysis of the concrete circumstances of the context where the waste is generated (Weidner et al. 2020)—is recovery, understood as the conversion of food waste material into energy, namely through anaerobic digestion (Papargyropoulou et al. 2014).

At the tip of the reverse pyramid suggested by Papargyropoulou et al. (2014)—and with the agreement of the scientific community (Cobo et al. 2018; Greben and Oelofse 2009)—is landfilling. Indeed, while it is possible—and, increasingly, legally required—to recover gases from landfill decomposition (Dhanya et al. 2020; Pearse et al. 2018), that is still not the norm, helping to make waste disposal the third largest human source of methane emissions (Esparza et al. 2020). In addition to occupying large areas and causing unpleasant odors, the impacts of landfilling are, according to Gao et al. (2017), ten times higher than those generated by any of the other available treatment methods, making landfilling the most "linear" solution for managing bio-waste. Nevertheless, landfilling remains the most popular bio-waste conversion method worldwide, particularly in developing countries (Feiz et al. 2020).

For Esparza et al. (2020), there is no one-size-fits-all solution for bio-waste management. Rather, the choice of how to deal with bio-waste should depend on an analysis of several factors, such as population density, volume of waste generated, installed collection practices, expected social acceptance, political–administrative availability for the implementation of projects, and assimilation capacity of generated products (Weidner and Yang

2020). Thus, the ideal bio-waste-management policy is one that adapts and chooses the most appropriate management methods for each reality it faces (Esparza et al. 2020).

4. Bio-Waste Management Drivers

4.1. A Comprehensive Review of Bio-Waste Management Drivers

To improve bio-waste-management policies, it is necessary to understand what pushes them forward or pulls them back (Márquez and Rutkowski 2020). We are dealing with the issue of drivers, understood as the "factors that positively (termed facilitators) or negatively (termed constraints) alter an existing waste management system" (Agamuthu et al. 2009, p. 625), or, according to Wilson (2007), the "mechanisms or factors that significantly impact development in (. . .) waste management" (p. 198). In fact, current bio-waste management systems have no single raison d'être but, rather, result from the impact of several factors, which vary across space and over time (Contreras et al. 2010).

Although there is not an abundance of literature on the drivers of waste management (and, in particular, bio-waste management), some authors have, over time and in different contexts, offered their own reviews of drivers (see Table 1 below), such as Wilson (2007), who, comparing bio-waste-management policies in developed and developing countries, highlights the drivers of public health, environmental protection, resource value of waste, closing the loop, institutional and responsibility issues, and public awareness, or Agamuthu et al. (2009), who analyze the Asian context and identify four categories of drivers: human, economic, institutional, and also highlighting the environment as a driver in its own right.

Table 1. Drivers vs. authors' comparative analysis.

Authors/ Drivers	Public Health	Environmental Protection	Resource Value of Waste/ Economic Dimension	Institutional and Reponsability Issues	Public Awareness	Human	Technology Development/ Scientific Knowledge	Legal
Agamuthu		+	+	+		+		
Contreras			+/—	+/—			+	+
Márquez & Rutkowski	+	+	+			+		+
Wilson	+	+	+	+	+			
Zaman		+	+		+			
Labels								
+	Directly expressed by the author							
+/—	Indirectly expressed by the author							
	Subject of direct analysis in the paper							

In turn, Contreras et al. (2010), studying waste management in Yokohama and Boston, analyze the temporal evolution of four distinct categories of drivers: socio-economic drivers, regional and international drivers, technology development and institutional drivers, and legal drivers. Zaman (2013) distinguishes three categories of drivers: social (which he subdivides into personal behavior, local waste management practice, and consumption and generation of waste), economic (where he highlights the resource value of waste, the economic benefit from waste-treatment facilities, and the landfill tax), and environmental (mentioning both global climate change and environmental movement and awareness). Finally, Márquez and Rutkowski (2020), in a historical analysis of waste management in Colombia, suggest the following drivers: public health, decentralization, financial sustainability, environmental protection, free competition, social control, integrated waste management, and inclusive recycling.

Despite the variation in the impact of each driver depending on the space and time under analysis, we believe it is possible to build, based on the literature analyzed, a logical and comprehensive summary of factors that can positively or negatively influence the evolution of bio-waste management in the European context. We therefore highlight the

following drivers: resource value of waste, public health, environmental protection, public awareness, scientific knowledge, and policy and legislation.

In fact, the first driver of bio-waste management was the resource value of waste (UNEP 2015), with waste pickers being at the center of the early stages of waste management generally (Rodić and Wilson 2017). Under the transition from the idea of "waste management" to an idea of "resource management" (UNEP 2015), and particularly in the context of the bio-waste portion of waste, the resource value of waste drivers is completely different in nature today than it was originally. Furthermore, given their impact on the choices made surrounding waste management policy, the costs of inaction on waste and issues related to financing waste management deserve consideration (UNEP 2015).

The second historical driver of waste management (namely bio-waste) was public health. Although it has since been surpassed as the main driver of waste-management policies, public health was one of the first and most important facilitators of these policies, which have evolved with the aim of stopping the spread of diseases in the urban environment resulting from uncontrolled waste disposal (UNEP 2015). Its relevance as a motivator for the adoption of new public policies on these issues remains significant in developing countries (Márquez and Rutkowski 2020), which have not yet overcome these challenges, and it has not yet been forgotten in developed countries either.

Moreover, among the drivers traditionally highlighted in the literature is environmental protection. The environmental movement established in the 1960s and 1970s (UNEP 2015) sharpened focus on the growing concern for waste in discussions about the sustainability of the planet. Nevertheless, the idea of environmental protection as a driver of bio-waste management has been disregarded by authors such as Agamuthu et al. (2009), for whom environmental protection constitutes a natural consequence of the action of other drivers. In fact, some authors have pointed out limitations to the analysis of drivers, highlighting the difficulty of understanding the actual influence of each driver, since they are interconnected (Zaman 2013), interacting in ways that can contaminate the analysis of the individual impact of each driver alone (Agamuthu et al. 2009).

Alongside these, we highlight drivers that only more recently have gained prominence. One example is the public awareness driver. Incredibly important for understanding the evolution (and future prospects) of bio-waste management, the public awareness driver can be divided into two components: public acceptance and personal behavior (Esmaeilian et al. 2018). Although initiatives on sustainable and circular bio-waste management have multiplied over the last years (Lemaire and Limbourg 2019), there is still a general lack of public awareness on the subject, which manifests itself both in the weak pressure exerted by citizens on public authorities and in the lack of sustainable practices of citizens themselves in bio-waste management (Weidner et al. 2020). Public acceptance and personal behavior promise to gain renewed importance as the EU pushes towards a brown-bin bio-waste collection system (Directive 2018/851).

Equally worthy of attention is the driver of scientific knowledge. Among its contributions to the design of new and more sustainable bio-waste management systems, it should be highlighted that scientific knowledge has contributed to the perfecting of existing bio-waste management technologies. In addition to the evolution of bio-waste management systems depending on the ability of scientific knowledge to improve existing methodologies through technological development, they also depend on the ability of scientific studies to analyze the efficiency of the different methods available and to propose the most correct solutions for each context. In this sense, the driver of scientific knowledge can be broken down into two dimensions: one theoretical, relating to the accumulation and maturation of the themes studied in the different forums by the literature, and one practical, relating to the creation of methodologies, instruments, and techniques of bio-waste management, and therefore more closely associated with an operational (or technical) dimension.

Finally, the policy and legislation driver should be considered. From political debate are born the legal instruments that seek to concretize the community's vision on each topic, and, in this case, on bio-waste management (Lemaire and Limbourg 2019; UNEP 2015). By

establishing the framework within which action on bio-waste must take place and the rules to which it must comply, legislation is both the limit and the guide to action on bio-waste management.

4.2. The "Policy and Legislation" Driver as a Make-or-Break Approach to a More Sustainable Bio-Waste Management

Legislation constitutes one of the main repositories of the secondary objectives associated with bio-waste management, such as public health, environmental protection, or resource value of waste (UNEP 2015), playing an essential role in the evolution of bio-waste-management policies.

In the European context, the influence of this driver on bio-waste-management policies is very closely linked to the European institutions, which have been the leading promoters of innovation in bio-waste management, particularly through the adoption of Directives. The first steps towards sustainable bio-waste management were made by the Landfill Directive (Directive 1999/31/EC) (Buratti et al. 2015), which set targets for a reduction in the volume of bio-waste landfilled and demanded the collection of the gases generated therein. Nine years later, although not addressing bio-waste in particular, Directive 2008/98/EC (Waste Framework Directive) established in the European legislative framework fundamental principles (polluter pays principle)—manifested in "pay-as-you-throw" (Ukkonen and Sahimaa 2021), "pay-as-you-own" (Messina et al. 2023), and "pay-as-you-differentiate" (Le Pera et al. 2023) schemes which have been studied and have proposed to encourage sorting at the household level (Chua and Yau 2022)—and concepts (producer extended responsibility and waste hierarchy) of current waste management (Taelman et al. 2018).

The next significant step in the field of waste management—and particularly in the field of bio-waste management—was taken by Directive 2018/851, which, amending the Waste Framework Directive approved ten years earlier, reinforced the need for Member States to take measures to reduce waste generation (Directive 2018/851). As it concerns bio-waste management, Directive 2018/851 highlighted the need to carry out selective collection of bio-waste, indicating that, to this end, by 31 December 2023, Member States should ensure the selective collection of bio-waste and its separation from other types of waste. This measure constitutes, for all intents and purposes, an obligation to implement a brown-bin system (Weidner et al. 2020).

Although the Waste Framework Directive (and amending Directive 2018/851) are recognized as being largely responsible for the significant advances recognized in waste management (and, in particular, bio-waste management) in Europe (Grosso et al. 2010; Zorpas et al. 2015), there is still much progress to be made in terms of sustainable bio-waste management. In addition to suggesting, given its specific characteristics, the development of a separate Directive for bio-waste, shortcomings are attributed to the European Directives approach to the subject of bio-waste.

Thus, we highlight the criticism of Garske et al. (2020), for whom it seems incomprehensible that Directive 2018/851 did not adapt the waste hierarchy of the Waste Framework Directive to bio-waste, especially when authors such as Papargyropoulou et al. (2014) had already suggested their own version of a food waste hierarchy. In addition, Garske et al. (2020) criticize the lack of a "quantified, measurable and thus sanctionable" food-waste-reduction target (p. 9), despite the fact that the Waste Framework Directive—as amended by Directive 2018/851—anticipates in its article 9 the possible creation of such a target.

Whereas the European Directives are given the role of determining how Member States should deal with the collection and treatment of waste, the regions and municipalities are tasked with deciding how to establish and control the implementation of their waste management policy (Taelman et al. 2018). It is therefore within the legislative framework established by these Directives that public entities throughout the European Union must approve legislation and implement public policies aimed at transitioning to more sustainable waste-management systems. In this sense, we highlight in the following section, under the "policy and legislation" driver, the emerging trend of co-creation, which can offer

significant contributions to the environmental transition of current bio-waste management systems.

5. Co-Creation as a Facilitator of Public Governance Which Promotes Sustainable Development

The magnitude and urgency of environmental problems (Scotford 2021), including the need to transition to a circular economy, require innovative approaches for fast and effective results. In the words of the Commission, "The sustainability challenge posed by key value chains requires urgent, comprehensive and coordinated actions" (European Commission 2020a).

In the EU, innovation for sustainability has received institutional support since 2015 by the European Research Area and Innovation Committee, and benefits from dedicated funding such as the Innovation Fund (European Commission, Directorate-General for Climate Action 2022). Moreover, an innovative process for normative production has been developed in the context of the so-called better regulation guidelines (European Commission 2021) and toolbox (European Commission 2023). One of the tools in the toolbox for better regulation is stakeholder consultation.

However, the participation of different social actors, including citizens, in the decision-making process in the public sphere is not a disruptive phenomenon. The forms of participation of multiple societal agents have varied in terms of their scope and intensity (Torfing and Ansell 2021). For this to continue to occur, it is essential that instruments that enable and enhance the participation of all parties exist and that they produce robust results from a coordinated effort based on a common purpose.

With prominence from the mid-1980s, the reforms of New Public Management (NPM) aimed to increase the involvement of citizens (users of public services), letting them choose freely among the different service providers, in a perspective in which private management gained primacy over traditional public management, recognizing at that time the implementation of different practices, models, and instruments coming from the atmosphere of private management (Hood 1991). According to this perspective, service users were seen as customers with heterogeneous needs and demands, and their participation in the design and delivery of the service was practically nil, an aspect referred to by various authors (E. Ostrom and Whitaker 1973; V. Ostrom and Ostrom 1971; Parks et al. 1981).

Several of the limitations of NPM have been recognized and debated in the literature, which has meant that the scientific community has since been attracted to a new, more innovative trend, that of "co-production", which is strengthened by growing budget constraints, new demands from citizens, the search for innovative solutions to complex problems (Wicked Problems) (Akamani et al. 2016), and the need to restore trust and foster transparency between voters and elected officials (Torfing and Ansell 2021). Efforts to promote the active involvement of citizens and other stakeholders in public governance have been spreading across a wide range of public sectors, insofar as the coordinated collaboration of different actors (volunteers, community organizations, and a broader ecosystem of actors) can constructively contribute to the implementation of collaborative-based public policies. In this sense, co-production has been considered in the construction of service systems and in the development of innovative solutions for public actors (Osborne and Strokosch 2013). The focus on the concepts of co-production and co-creation adopted in the public sector is based on the evolutionary trends in the private sector. The first source of new ideas on co-production and co-creation in the public sector came from the field of design. The second source emanates from new thinking about how private companies interact with their customers (Torfing and Ansell 2021).

In this review, we join the definition of co-creation presented by Torfing et al. (2019) that embodies "a process through which two or more public and private actors attempt to solve a shared problem, challenge, or task through a constructive exchange of different kinds of knowledge, resources, competences, and ideas that enhance the production of public value in terms of visions, plans, policies, strategies, regulatory frameworks, or

services, either through a continuous improvement of outputs or outcomes or through innovative step-changes that transform the understanding of the problem or task at hand and lead to new ways of solving it" (p. 802).

By defining co-creation—in contrast to co-production as a problem-focused process aimed at creating new and innovative outcomes that generate public value, it is possible to perceive co-creation as a tool for public governance, aimed at mobilizing and harnessing society's resources (Torfing and Ansell 2021). Hence, according to these authors, one of the values of the concept of co-creation is that, like collaborative governance, it relates to other emerging trends in governance (Torfing and Ansell 2021). One of the most important characteristics of co-creation is that it emphasizes the role of collaboration in achieving innovation. The literature on public sector innovation highlights the importance of involving wider groups of stakeholders in collaborative innovation processes (Sørensen and Torfing 2019).

Adopting a design attitude, co-creation sees innovation as built on the distributed experience, knowledge, resources, and insights of users, citizens, and other stakeholders, who are seen as sources for creative solutions to problems when brought together in arrangements that increase the likelihood of formulating and implementing social innovation (Brown and Wyatt 2010).

One of the virtues of co-creation processes is that they adopt a proactive strategy, rather than the usual reactive positioning. It is in this context that the agenda for collaborative governance has been gaining prominence, associated with a concern with the mediation of conflicts between the constituent parts of a given institutional arrangement (formal or informal). Thus, the process of co-creation has been understood as a mitigating filter to the barriers associated with collaborative governance, positioning itself as a potential "collaborative advantage" for working together (Huxham and Vangen 2013).

Notwithstanding the advantages of co-creation presented above and recognizing the broad relevance of co-creation to public governance, some associated risks have also been noted. A recent qualitative study considered co-creation processes in three Scandinavian municipalities and found that while co-creation emerges almost spontaneously at the level of administrative service delivery and design, public managers and elected officials are reluctant to adopt co-creation as a tool for social well-being, as a problem solver and as a tool for policy making (Bentzen et al. 2020). At the administrative level, co-creation is mainly considered in urban-development projects, where it is crucial to mobilize local resources and support. The barriers to co-creation at the political level are even stronger (Torfing and Ansell 2021).

Another difficulty associated with co-creation relates to the lack of alignment between the expectations of (unelected) public managers about the role of politicians and what their function actually is. Another barrier relates to the lack of institutional platforms for co-creation that engage citizens, politicians, and relevant stakeholders in creative problem-solving processes.

Co-Creation as a Driver for SDG Implementation

The ambition to meet the Sustainable Development Goals requires a paradigm shift in everyone's actions. In this sense, in order for the process of change to occur, there is an urgent need for the search, formulation, implementation, empirical testing, and evaluation of innovative solutions that can be developed within the framework of collaborative governance. In this context, several cities and national governments have called for the co-creation of innovative climate solutions, and there is already positive experience with co-creation in public planning and service production (Hambleton 2019; Hofstad et al. 2023; Sørensen and Torfing 2018).

Both the European Commission and the United Nations emphasize the importance of promoting the involvement of citizens and other stakeholders in the implementation, codesign, and co-assessment of climate resilience. The objectives formulated can only be achieved (or at least come closer to being achieved) if action is developed through

partnerships, networks, and other collaborative governance platforms. Although there are associated barriers, as previously mentioned, co-creation is present in today's public policy making, mainly due to its ability to mobilize social resources, stimulate problem solving, share risks, and build joint ownership of new and differentiated solutions (Torfing and Ansell 2021). Although the importance of co-creation processes has been made clear in theoretical terms, efforts to conduct co-creation processes associated with climate change have received weak buy-in from researchers and public managers (Hofstad and Vedeld 2021). The rise of collaborative governance supported by networks and partnerships has been driven by the growing appreciation of mutual dependence between public and private actors, sometimes associated with decentralization exercises, although not always well anchored in a stable budgetary envelope, or with legal vicissitudes, hindering their proper implementation.

Thus, the current panorama indicates that many local governments are making efforts to produce innovative solutions to achieve the goals set at national level, although with poor alignment with the regional and local reality. At the same time, it is crucial to continue to foster broad support from communities for green change, which should be supported by clear information on the processes, their objectives, and actions to be taken, objectively warning that this change will mean some disruption compared to what we have been used to until today, as it concerns the way we live, work, and consume. To this end, the formulation of urban-climate-mitigation strategies must be inclusive and participatory, and must facilitate a balance between sustainability goals and social justice.

6. Conclusions

Concerns about the sustainability of our planet have found justified reflection in the issue of food systems. As we have explored, food production results in significant environmental impacts, which increase as global population numbers grow and as developing countries' food evolves. The concept of the circular economy, which has become increasingly popular over the last years, has forced us to shift discussions on this matter to the concept of circular food systems and, consequently, to rethink the way society deals with food waste and, more generally, bio-waste. Among the issues surrounding this matter, the drivers of bio-waste management assume a part of the utmost importance, with their analysis offering an understanding of the factors that push bio-waste management forward or hold it back (Márquez and Rutkowski 2020).

Seeking to respond to the challenge outlined at the beginning of this review, we highlighted the following drivers: resource value of waste, public health, environmental protection, public awareness, scientific knowledge, and policy and legislation. With this exercise, we sought to contribute to a unitary, comprehensive, and comparable review of bio-waste management drivers in the European context, hoping both to offer a basis for further research on the matter and to inform public decision makers about the factors that can contribute to advancing or hindering the construction of more sustainable bio-waste management systems.

This study also allows us to highlight the centrality of the policy and legislation driver in the current European panorama of bio-waste management. In particular, the significant influence of European Directives on the development of bio-waste management systems in European countries, particularly through Directive 2008/98/EC and Directive 2018/851 and the brown-bin policy they put forward, should be noted. At the same time, we sought to highlight the role of co-creation as an instrument to facilitate a public-governance paradigm capable of promoting sustainable development.

It is commonly accepted that co-creation processes that mobilize the experiences, resources, and ideas of various public and private actors in the creation of public solutions have been gaining prominence. There are already significant examples of local governments making efforts to promote citizen involvement in the provision of public welfare services and in solving social and political problems and challenges. Also at a regional level, there are examples of co-creation processes in strategic planning and transport, involving

private stakeholders. At the national level, governments have fostered the creation of collaborative convergence forums to monitor and follow up on the processes of formulating and implementing collaborative-based public policies that can meet the needs and demands of the community. In some countries (with a special emphasis on Northern European countries), there is already a long tradition of citizens, civil society organizations, and public authorities using co-creation processes to find solutions to common problems.

In this sense, co-creation may become central to bio-waste management in the near future. As an innovative element in the creation and implementation of public policies for sustainability, co-creation can adopt the same role in bio-waste management, an area particularly suited to the convergence of local governments, citizens, and other stakeholders for the collaborative construction of solutions that are better suited not only to the specific circumstances of each community and the interests of the various actors but also to the interests of the planet.

The limitations of the present article should not be ignored. To this end, this article has not explored the differences between European countries in terms of the bio-waste management systems that they have in place and the factors that influence them. This meant that, in terms of the "policy and legislation" driver, no attention was paid, for example, to the differences between national legislations or political and/or cultural values. At the same time, having opted for an informed review of the drivers that are most suited to the European reality, the relative impact of each of the drivers pointed out or the perception of professionals in the field about their impact remains to be studied.

Achieving the vision of more sustainable bio-waste-management systems, however, requires a significant effort by the scientific community, namely through the production of municipal, inter-municipal, or regional studies that analyze existing trends in the impact (or lack thereof) of collaborative arrangements on the pursuit of more sustainable bio-waste management. Researchers should aim to use the information gathered therein to create a database that brings together current best practices, which could then serve as a benchmark to be applied on a wider scale. Similarly, as the European context under analysis in the current article is not homogenous, studies should be carried out that explore and compare between-countries trends and how these could influence supra-national trends. Studies of national-level drivers should also not be ignored, as their understanding can play a key role in achieving bio-waste-management targets.

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Article

The Inner Functioning of Local Governance Networks in Centralized Countries: A 'Brave New World'?

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Abstract: Local governance networks are increasingly seen as the big idea to cope with issues that are complex enough in scope and scale to require a diversity of expertise and resources. While conventional narrative has posited that local networks are optimal for addressing a range of policy problems, and enhancing democratic participation, scarce attention has been devoted to understanding their inner working. A relevant gap in the literature pertains to the impact of central government intervention in igniting such arrangements on the diversity of actors, the intensity of interactions among actors, or their coordination practices. Such assessment is particularly relevant in centralized contexts. This article seeks to map and characterize the inner working of local networks in such a context—Portugal. The empirical analysis highlights the crucial role of central government in igniting local networks and in ensuring higher levels of formal intensity of collaboration to reduce transaction costs. Keeping such arrangements under the radar of central government, however, may curtail the diversity of actors, policy areas, and curb stakeholders' commitment in local governance arrangements.

Keywords: coordination; diversity; governance networks; intensity; local government; Portugal

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1. Introduction

Defied by political, social, economic, and demographic challenges, contemporary local governments have been forced to operate within a diverse range of formal or informal structures of exchange and production with other relevant stakeholders, namely through local governance networks (LGNs) (Egner et al. 2022; Teles et al. 2021; Teles 2016; Stoker 2004, 2011). Through these networks, local governments aim at addressing a range of policy problems, securing agreement on solutions, and struggle to maintain negotiated consensus between involved actors over time (Lewis et al. 2017; Nelles 2013; Teles 2016). LGNs, hence, emerge as arrangements that ignite complex negotiations between members and seek to secure state–society agreement over time, with varying levels of institutionalization (Silva et al. 2022).

The increasing use of these LGNs has been subject to increasing academic interest. However, most of this research has been focused on countries with a significant governance cooperative culture, such as the Netherlands, Switzerland, Denmark, or the United States of America (Lewis et al. 2017; Agranoff and McGuire 2001; Cristofoli et al. 2021), and mostly focused on the variables that impact the performance of such networks, as mentioned by Klijn et al. (2020).

Despite extant research, many questions remain unanswered. From a theoretical standpoint, while conventional narrative has posited that LGNs are optimal for addressing a range of policy problems, and enhancing democratic participation, scarce attention has been devoted to understanding the factors that influence the inner working of LGNs. Specifically, the role of central government intervention in terms of the diversity of actors, the intensity of interactions among actors, or their coordination practices, particularly in

centralized contexts, has been less explored. LGNs may have indeed started to become more common since the 1990s, but there are still huge challenges attached to their use vis-a-vis the traditional use of hierarchies, particularly in centralized countries where the hierarchical mindset prevails, hence our question about the use of networks in such contexts being a "brave new world".

The empirical assessment of the inner workings of LGNs has also been limited. Considerable research has been focused on the strengths and limitations of the repertoire of tools of regional governance (Feiock 2007). As Teles (2016) rightly asserted, existing research has not yet provided enough attention on mapping and assessing the complexity of LGNs, or the choice of the architecture and intensity of collaborative networks. Existing conceptual toolkits to measure the extent to which LGNs are effective arrangements tend to be pursued within the confines of intermunicipal networks (Nelles 2013; Silva et al. 2018), with little systematic attempts to assess the governance capacity of all forms of LGNs, without attempts at clarifying the impact of centralized governmental-administrative procedures in determining the functioning of LGNs.

This article seeks to address these gaps, by mapping LGNs' inner functioning, analyzing their diversity, intensity, and coordination practices, as well as the influence exerted by the central government and territorial contexts in this inner functioning. It does so by considering a wide repertoire of LGNs across several policy domains which were created either by a mandate from the central government (top-down) or created by the initiative of local governments or other local actors (bottom-up). Empirically, this research[1] draws in a unique dataset that captures the diversity in LGNs in Portugal, where governance collaborative efforts have become more common (Mota et al. 2021; Mota and Bittencourt 2019) but where local government is kept tightly under the radar of central government.

Overall, results suggest that in centralized countries, LGNs can demonstrate high levels of vitality both in terms of the number and typology of actors involved. Central government directives emerge as fundamental in igniting LGNs, particularly in smaller and less densely populated municipalities. Additionally, central governments' involvement tends to trigger the intensity of LGNs. Such a role, however, may negatively impact the number of policy areas dealt by LGNs, and the number of local stakeholders involved. Moreover, the tendency to rely on municipalities for the management of such arrangements may discourage other stakeholders' participation.

This article is structured as follows. First, the theoretical framework to analyze LGNs is presented. The second section seeks to describe the variables that can be empirically conceptualized to comparatively map the complexity of LGNs and their functioning. This is followed by a specific account of the relevance of such networks in the Portuguese case, as a typical case study of low levels of decentralization. Section 3 presents the data collection strategies, and the operationalization of variables, and Section 4 presents the main results and discusses these findings. The article ends with a summary of the research findings, theoretical and practical implications, and future research agenda.

2. Analytical Framework

2.1. Local Governance Networks: A Brave New World?

In a convoluted and multi-layered world of limited resources and multiple demands, governance networks—here defined as "sets of autonomous yet interdependent actors (individuals, groups, organizations) that have developed enduring relationships in governing specific public problems or policy programs" (Klijn and Koppenjan 2014, p. 61)—came to be regarded as "an effective and legitimate way of governing our increasingly complex and fragmented societies and economies" (Torfing et al. 2012, p. 30).

Although not an entirely new phenomenon in Western societies, the interaction between a plethora of public, semi-public, and private actors in policy formulation and implementation networks grew exponentially over the last decades, and especially from the 1990s (Klijn and Koppenjan 2015; Sørensen and Torfing 2007). At some point, an eventual paradigm shift "from government to governance" has been started to be discussed

in the literature, but also widely contested with some authors arguing the idea of a loss of power from traditional political and public actors to be clearly exaggerated, claiming that the discussion should be rather about the "changing powers" of these actors (Torfing et al. 2012; Peters et al. 2022). Regardless, it has been posited that no single actor possesses, on its own, enough knowledge, capacity, scrutiny power, or action potential to address the complexities and challenges of public policy implementation, service delivery, and the growing number of "wicked problems" (Klijn and Koppenjan 2015; Torfing et al. 2012).

Despite their increasing importance, governance networks may not be regarded as a governance panacea. Their advantages, such as the promotion of more innovative and flexible policy solutions, are counterbalanced by several potential problems, such as the difficulty to coordinate multiple actors with different interests and logics of action, the blurring of responsibilities, or the capture of participation by more powerful actors (Klijn and Koppenjan 2015; McGuire and Agranoff 2011; Torfing et al. 2012).

The subnational governance sphere has been no stranger to such reformist trends. As Teles (2016, p. 7) rightly asserted, most of the "significant territorial reforms" the European continent has experienced over the last four decades have been accompanied by "interesting experiments on local governance systems". Driven by national governments to address complex issues that can best be met at the local level (Stoker 2004), fostered by the European Union (EU) as instruments of regional development policies (McCann 2015) or self-grown, LGNs are seen as positioned to tackle political, social, economic, and demographic challenges confronting local authorities and their communities today.

The increasing importance of networks in different governance levels has been paralleled by a growing academic interest. After a first generation of studies focused on governance networks' comparative advantages and disadvantages, a second generation of studies has been focused on the identification of the main factors that explain their success and failure (Sørensen and Torfing 2007), while also providing relevant frameworks of analysis (e.g., Ansell and Gash 2008; Skelcher and Sullivan 2008). One of the most famous of these frameworks is the one presented by Ansell and Gash (2008), who explained that the networks' outputs are influenced by the collaborative process itself, which, in turn, is influenced by its starting conditions, the institutional design, and the facilitative leadership.

The existing research on the topic has nevertheless neglected the study of the potential variables that determine the choice of the inner workings of LGNs, such as the diversity of network members, the intensity of their work, or the coordination structures and practices, despite very recent and notable exceptions (Klijn et al. 2020). One of these often-neglected variables pertains to the effect of central government on the inner working of LGNs or the importance of territorial context (high or low-density municipalities), particularly in centralized countries and/or countries with a scarce tradition of cooperation (Mota and Bittencourt 2019) or in countries with huge differences between urban and rural areas. If we consider central governments as potential 'sponsoring' agents or even as network managers or coordinators, their importance to network performance is recognised, particularly when there is a lack of trust among network members or when there is a need to gather a wide diversity of actors (Ansell and Gash 2008). Most of these studies, however, are concentrated within contexts with robust local governments and strong civil societies (e.g., Agranoff and McGuire 2001; Lewis et al. 2017; Milward and Provan 1998). Centralized countries where LGNs are being increasingly used but where there is no collaboration culture have been disregarded, despite the considerable influence of central governments as the main drivers of LGNs with the potential drawback on such networks' autonomy, as illustrated by the Portuguese case (Mota et al. 2021).

2.2. Mapping the Inner Functioning of Local Governance Networks

This research seeks to map and characterize the wide spectrum of LGNs, considering unitary and centralized European countries, particularly Portugal. Specifically, this article seeks to chart the diversity, intensity, and coordination of Portuguese LGNs and to assess

both their interactions and the effect of central government intervention as a stimulator of LGNs. This section seeks to present the relevance of these three indicators.

The first relevant indicator is related to *diversity*. Diversity reports to the "inclusion of a diverse range of actors and institutions" in LGNs (Carabine and Wilkinson 2016, p. 64). The concept highlights the fact that networks' actions and outcomes are affected by dyadic (or multiple) relations, as well as by the overall structure of the network (Robins et al. 2011). It refers to the type of actors (public, private, third sector organizations, etc.) involved and the complexity of LGNs: as the diversity of participants increases, the diverse interests, goals, and expectations make the identification of a shared strategy towards common objectives more complex (Eagle et al. 2010). It has also been argued that a wide variety (of types) of actors may curtail the scope of potential policy agreements and the credibility of commitments to fulfil agreements (Schneider et al. 2003). Diversity may also be stimulated or curtailed by the degree of centralization of interactions, i.e., how hierarchical the structure is, and the role central government has in stimulating and sponsoring these networks (Ansell and Gash 2008). On what concerns the territorial context, less diversity may be expected in municipalities of low population density, as the social fabric is less dense.

The second variable is the *intensity of interactions*. Intensity refers to the frequency of interactions and meetings among members. LGNs with greater diversity may require a higher degree of intensity to promote group cohesion, reduce enforcement and monitoring costs, and to increase the cooperation within LGNs (Park and Park 2009). In turn, this cohesion promotes various positive benefits, such as higher internal support, higher individual satisfaction, lower team conflict, and lower team member turnover. Thus, members of a cohesive group develop shared values and team loyalty, creating smoother and more effective communication (Sandström and Carlsson 2008; Silva et al. 2022). The relationship between group cohesion and network success has been widely explored, empirically suggesting a strictly positive relationship between group cohesion and network performance (Balkundi and Harrison 2006). Consequently, one may assume that LGNs whose creation was mandated by the central government may require more regular meetings, since the network was not created by the initiative of either of the network members. On what concerns the territorial context, less intensity may be expected in municipalities of low population density, as there are more chances of network members having a history of previous cooperation.

A third relevant dimension pertains to *coordination*. Coordination refers to the presence of a link (or structure) that supports governance processes and activities, with the purpose of bringing stakeholders to a consensus and engaging each other in a collaborative spirit. As explained by Torfing et al. (2012), coordination or leadership functions in governance networks do not need to be necessarily developed by top political/public decision makers. Instead, other actors may play relevant roles, as long as they are perceived as being legitimate actors, have access to key resources, and have institutional capacity to monitor and coordinate the network. Therefore, one may assume LGNs that are mandated by the central government or created by municipalities to be coordinated by political decision makers. It is expected for this trend to be even higher in municipalities of low population density, as municipalities may be the only network member with organization capacity to coordinate the network.

While diversity and intensity may reduce the efficiency of LGNs—as transaction costs tend to increase (Park and Park 2009)—coordination may emerge as a relevant intervening variable. If a core faction acts as the LGNs gatekeeper (with an effective network manager), it becomes possible to accommodate a larger set of participants and widen the sphere of action, since the involvement of all actors may no longer be required for many (routine) network decisions. Hence, a centralized coordination (with specific external structures) can help circumvent the time-consuming and resource-intensive activities, along with the transaction costs involved (Feiock and Scholz 2009; Park and Park 2009). Arguably, a centralized specific management structure may facilitate the ability of attracting different

stakeholders and facilitates (or coerces) collaboration among actors (Ansell and Gash 2008; Emerson et al. 2012).

Centralizing the integration of the network through a central core agent (e.g., network initiator, structure of coordination, and/or leadership) could have effects on the commitment degree within network members (Balkundi and Harrison 2006).

2.3. The Portuguese Context

This research is focused on the Portuguese case, as a typical case of a unitary European country, with a low level of decentralization.

Since the transition to democracy, Portugal has gradually established local autonomy as one of the basic principles of local government, by defining new competencies, powers, and resources in the 1976 Constitution. Since 1976, the Portuguese Constitution envisages three types of local authorities: administrative regions, municipalities, and civil parishes. Administrative regions remain, however, as a mere constitutional feature in the mainland, with only two levels of subnational governance: municipalities and civil parishes. The regional level thus only exists for the two autonomous regions—the archipelagos of Madeira and of Azores—which have their own regional governments and legislative assemblies. With a somehow dormant debate of regionalization, one has been witnessing different timid waves of decentralization with municipalities receiving some competences in several policy domains, although mostly related with public management rather than with policy formulation and not always followed by the correspondent transfer of funds (Teles 2021).

Despite the mentioned principle of local autonomy and the increasing number of competences being transferred to local authorities, Portugal still displays a low level of actual decentralization. Taking into consideration the Decentralization Index of the European Committee of the Regions (CoR n.d.), Portugal has a medium-low level of overall decentralization, with local authorities having a medium level of formal competences and political power but a low level of human and financial resources at their disposal.

In the absence of administrative regions, reinforcement of subnational levels of government would occur through the creation of intermunicipal platforms, which would be sufficiently comprehensive at geographic and population levels that could serve as groundwork for new steps in decentralizing the country. The Portuguese Constitution of 1976 recognizes the right to establish associations and federations of municipalities to administer common interests. Since then, many associations were created aiming at specific common purposes in areas such as water supply and wastewater treatment; urban cleaning and waste management; development of software for local authorities; distribution of fuel gas; environmental protection; integrated management of local resources; and culture and regional development.

These features make local government relatively fragile in Portugal, at least compared with most of its European counterparts (Teles 2016), particularly concerning their financial means and the fact that Portuguese local authorities remain tightly under the radar of the national government, despite the gradual increase in local government competences. While working within a relatively fragile scenario, mayors are particularly relevant and powerful vis-à-vis other elected members, given the electoral system and mayors' wide-ranging set of powers (Sousa 2015; Tavares et al. 2018). The pivotal role of both the mayor and the municipality may also weaken the active participation of civil society actors (Tavares et al. 2018). Overall, Portugal has been characterized by low levels of civil society involvement in advocacy functions, focused instead on service provision tasks (Franco 2015).

3. Data and Methods

This study focuses on LGNs in which Portuguese municipalities develop their political activity. There is a total number of 278 municipalities in mainland Portugal. To allow for an analysis of the different LGNs, a representative sample was selected, through a partially intentional sample of sixteen (16) municipalities, considering the NUT II level of territorial division[2]. As this system of territorial organization includes NUT with different

municipality numbers, a stratified sample was built considering municipalities with high and low population density, as reported in Table 1. Criteria for the assessment of population density derive from data available at PORDATA (n.d.) (data regarding 2018), estimating an average value at the national level (111.7 in 2017). Below this value, municipalities were considered to be low density; above this value, they are equated as high-density municipalities. Within this frame, in some NUTS, no cases would have been selected (e.g., high-density municipalities in the Algarve/Alentejo). In these cases, one case was included to maintain national coverage.

Table 1. Data sampling and case selection.

Pop. Density	NUTS II	Nr. of Municipalities	n Sample	Case 1	Case 2	Case 3
High	North	41	**2**	Porto	Valença	-
	Centre	32	**2**	Lousã	Ílhavo	-
	Lisbon M.A.	18	**1**	Amadora	-	-
	Alentejo	1	**1**	Cartaxo	-	-
	Algarve	7	**1**	Olhão	-	-
Low	North	45	**2**	Vimioso	Baião	-
	Centre	68	**3**	Idanha-a-Nova	Montemor-o-Velho	Guarda
	Lisbon M.A.	0	**0**	-	-	-
	Alentejo	57	**3**	Mértola	Santarém	Portalegre
	Algarve	9	**1**	Alcoutim	-	-
TOTAL		278	**16**			

Source: own production.

After the selection of these 16 municipalities, we performed a systematic scoping analysis of municipalities' websites and Facebook accounts to identify the existing LGNs (our unit of analysis) in each municipality. A total of 167 networks were identified. The identified 167 networks were then analyzed concerning the identified variables through a systematic analysis of networks' statutes, election minutes, and meetings. Formal constitution decrees were also considered.

Table 2 provides the operationalization of each dimension used to characterize LGNs, as well as descriptive data. Diversity of networks is assessed through the number of members and the fragmentation of LGNs across different policy areas. Arguably, addressing a wider range of policy domains generates higher predisposition of actors to strategic and cross-cutting problems, which encompass the higher commitment of municipalities (Nelles 2013). Intensity is operationalized through the frequency of interactions within network stakeholders (Hawkins 2010). For analyzing this dimension, the annual number of times that members meet was considered, assuming the formal constitution of the arrangement. When specific regulations were not available, general rules defined by national law (decree) were assumed. Finally, the *coordination of LGNs* was assessed through the different coordinators: 98 led by municipalities; 24 by other stakeholders; and 44 coordinated by specific management structures.

Table 2. Local governance networks: dimensions and operationalization.

Dimension	Operationalization	Min	Max	Average	Standard Deviation
Diversity	Number of stakeholders	4	140	26.65	23.87
	Policy areas	0	13	2.92	3.57
Intensity	Number of annual meetings	1	24	4.54	4.05

Source: own production.

In addition to the variables related to the inner functioning of LGNs, networks were also classified according to their drivers. The vast majority of LGNs were mandated or promoted by national law (107 networks). The remaining networks were created by the initiative of municipalities (23) and other local stakeholders (38).

4. Data Analysis and Discussion

This article seeks to characterize these networks considering their inner workings (and interconnections), estimating their diversity, intensity, and coordination, while estimating the effects of central government on such dimensions. The descriptive statistics of data gathered are reported in Table 3.

Table 3. Number of networks and actors involved, by population density and NUTS II.

Population Density	NUTS II	Networks	Average Number of Actors
High	North	30	29.56
	Centre	20	22.80
	Lisbon M.A.	9	26.77
	Alentejo	11	29.63
	Algarve	6	27.66
Low	North	15	16.73
	Centre	32	25.59
	Lisbon M.A.	-	-
	Alentejo	34	34.15
	Algarve	10	14.30
TOTAL		167	26.65

Source: own production.

Despite being frequently absent from the mainstream of scholarly debates, LGNs structures have made their way within this potentially unfavorable scenario of Portugal, though with different degrees of diversity of actors, intensity of cooperation, and coordination. As it is possible to observe, there is no big difference between municipalities with high and low population density on what concerns the tendency to be involved in LGNs or the average number of involved network members.

As revealed in Figure 1, these networks in low-density municipalities are mostly driven by national governments and local stakeholders. LGNs in low-density areas tend to be directly stimulated by the central government, as a deliberate strategy to stimulate the emergence of LGNs in a policy field (UCLG 2013). For the central government, these networks constitute a means to stimulate the implementation of certain policy objectives at the local level and facilitate territorialized policies, which are tailored to local needs and contexts. It is also relevant to the fact that bottom-up processes of creation of LGNs are particularly relevant in low-density areas. This somehow surprising result may be related to the emotional attachment local stakeholders have to their municipality or even the pre-existing social capital. On the contrary, municipalities tend to be the main drivers of LGNs in high-density regions, where local stakeholders depict a lower capacity or interest to be involved, at least as promoters of such networks, as portrayed in Figure 1.

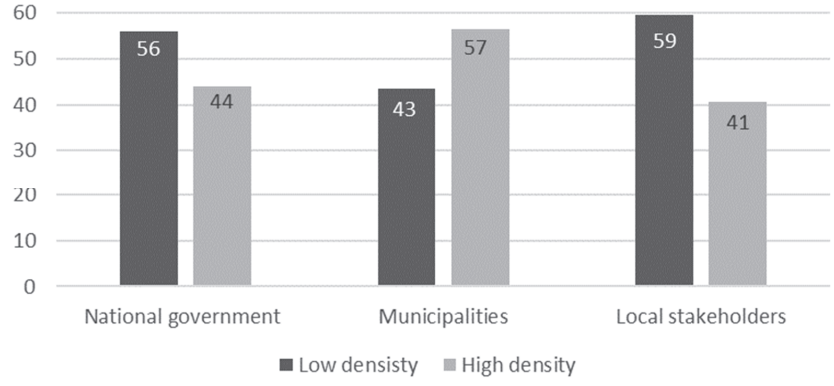

Figure 1. Drivers of local governance networks in high- and low-density municipalities. Source: own production.

Notwithstanding, there are no significant differences between the number of policy areas tackled by LGNs operating within high- or low-density municipalities (Kruskal–Wallis H test: $\chi^2(1) = 0.011$, $p = 0.915$). This does not mean, nevertheless, that LGNs dealing with multiple policy areas tend to include a wider variety and number of local stakeholders. On the contrary, results of the Pearson correlation indicate that there is a significant negative association between the number of policy areas dealt with by the LGNs and the number of stakeholders involved ($r(166) = -0.202$, $p = 0.008$), a pattern that holds when we consider both low- and high-density municipalities, as depicted in Figure 2.

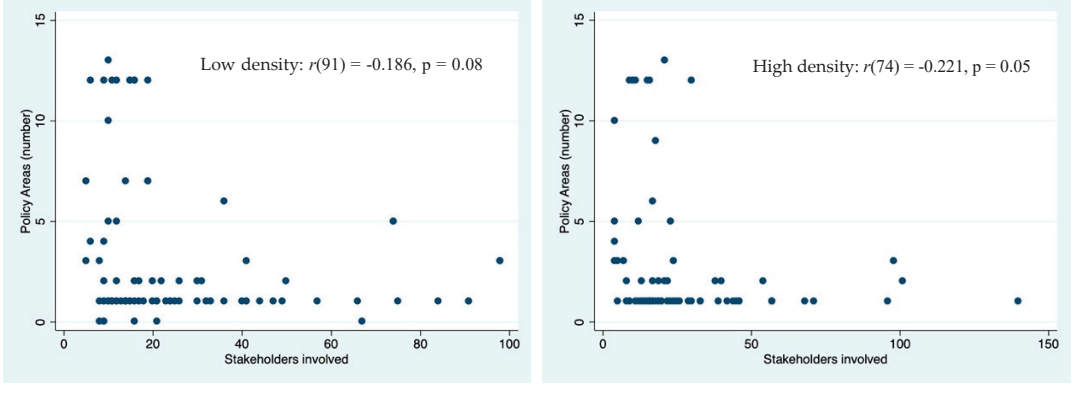

Figure 2. Local governance networks by policy areas and stakeholders involved in low density (first figure) and high density areas (second figure). Source: own production.

The negative correlation tends to suggest that dealing with complexity and avoiding the fragmentation of issues between specialized policy areas require greater commitment from local stakeholders, which may be difficult to achieve. In fact, only 35% of the networks develop activities in more than one area (67 out of 167). Here, context matters. Within centralized countries, LGNs tend to be able to operate on a stringent set of policy areas, as most policy issues remain a prerogative of national governments. Portuguese LGNs tend to be focused on social and youth policy (14.7%); environment (8.9%); and culture (8.1%). Less than 1% of LGNs tend to be involved in research, citizenship, and taxes and fees, policies that tend to remain in the hands of national executives. Most importantly, LGNs ignited by national governments tend to deal with a significantly lower level of policy areas. A Kruskal–Wallis H test showed that there was a statistically significant difference

in the average number of policy areas in LGNs ($\chi^2(2) = 20.628$, $p = 0.0001$), with networks promoted at the national level dealing with 2.6 policy areas, while those stimulated by local stakeholders tend to deal with 4.2 policy areas.

Additionally, the drivers of LGNs can also impact the diversity of participants. Again, national governments' directives appear to have a negative impact on the involvement of a diversity of actors (Figure 3). While these differences are not statistically significant, the average number of participants in LGNs is higher in locally driven LGNs (mean score of 30.8 participants). On the contrary, those stimulated by national governments depict an average of 26.2 participants per LGN.

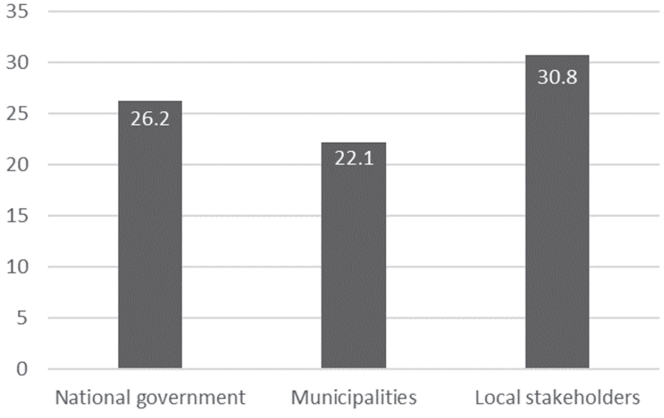

Figure 3. Average number of participants, by the initiator of local governance networks. Source: own production.

In terms of the type of participants involved, results suggest that LGNs tend to be pervaded by public actors (58.9%), as presented in Figure 4. LGNs are also comprised of TSOs and business and industry associations, representing, respectively, 22.4% and 6.9% of the total number of stakeholders. Citizen groups and local personalities are scarcely represented, with only 3% of the total universe of actors (n = 4450). In parallel, higher education institutions represent only 1.3% of the identified stakeholders. Concerning the distribution of types of stakeholders between the two groups (low and high population density), public actors are predominantly present in both, having similar distribution also for the remaining categories of stakeholders, with no significant differences.

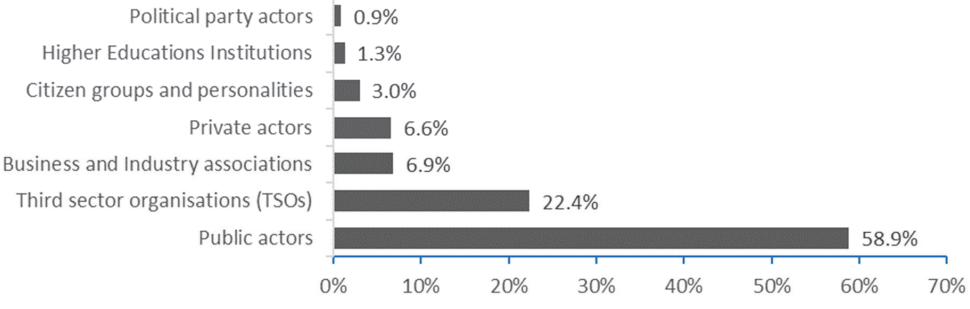

Figure 4. Distribution of stakeholders (%). Source: own production.

As mentioned before, intensity was measured through the frequency of meetings. As depicted in Figure 5, interactions occur more frequently within LGNs stimulated by national governments. A Kruskal–Wallis H test revealed that there is a statistically signif-

icant difference in the average number of meetings in LGNs ($\chi^2(2) = 35.541$, $p = 0.0001$), considering the initiator of networks. While bottom-up approaches may stimulate the involvement of a higher number of participants, the intensity of their interaction is lower, at least formally. In fact, results of the Pearson correlation indicated that there was a significant negative association between the number of participants and the intensity of interaction within their local governance arrangement ($r(112) = -0.60$, $p = 0.012$). This result may be related to the fact that networks created by national governments do not necessarily include network members who are involved willingly or by the fact that these networks deal with more complex issues, hence the need for network members to meet more often.

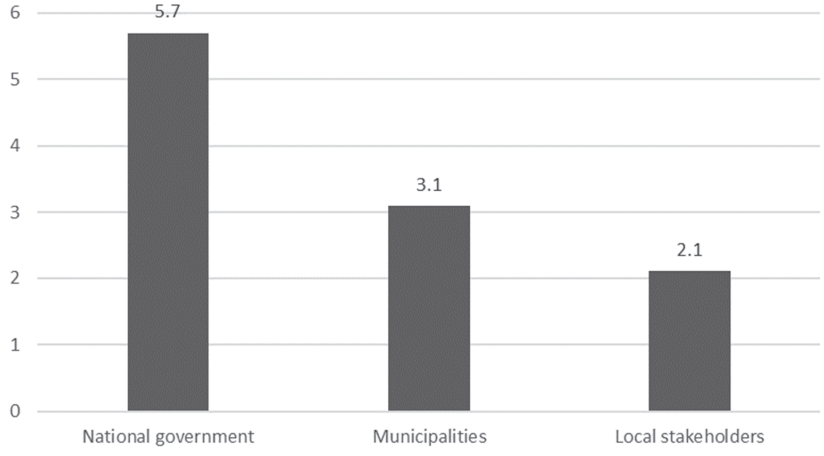

Figure 5. Average number of meetings, by initiator of local governance networks. Source: own production.

Imposed governance structures also generate less positive incentives in terms of coordination. Imposed-driven networks tend to remove the incentives or the possibilities for other relevant actors to be involved in coordination tasks, as Table 4 demonstrates. Overall, concerning the distribution of networks according to the structure of coordination, local government hold the coordination of 58.7% of the total identified networks, while 26.4% are assumed by a specific structure of coordination. There are also 14.4% of networks led by other local actors.

Table 4. Triggers of local governance networks and coordination.

		Coordination		
		Local Government	**Other Local Stakeholders**	**Specific Management Structure**
Triggers of local networks	National government	74.8	4.7	20.6
	Municipalities	78.3	23.0	8.7
	Local stakeholders	0	43.2	45.1
	Overall	58.7	14.4	26.4

Source: own production.

Centrally driven LGNs and local governance structures boosted by municipalities tend to generate coordination structures dominated by local governments. In such scenarios, local governments assume the role of network leaders considering its' dominant position both in controlling relevant flows of information and access to key resources. Whereas the national degree level alone would suggest lower commitment of local stakeholders to be involved in such LGNs' coordination and management structures, the existence

of municipal regulations and the adaptation of national directives suggest government leading networks are replicated at the local level. This result is not surprising as local stakeholders other than municipalities often do not have the organizational capacity to play coordination tasks. As explained before, mayors and councilors play a pivotal role in local governance (Tavares et al. 2018).

Coordination, however, has a bearing on other relevant dimensions. First, the centralization of management structures in the hands of political and public actors may discourage other stakeholders' participation, a potential further explanation regarding the lower levels of actors' diversity, as aforementioned. On the contrary, voluntary LGNs generate higher predisposition to other coordination strategies, allowing more participated processes, diversity of stakeholders, and, potentially, more flexible approaches to problem-solving, positively impacting motivation and willingness to move forward to new challenges. Local government leading networks tend to generate significantly lower levels of participants (lower diversity). There was a statistically significant difference between groups as determined by one-way ANOVA ($F(3.163) = 2.82$, $p = 0.004$). A Tukey post-hoc test revealed that the number of stakeholders involved tends to be statistically significantly higher in the group of LGNs that are coordinated by other local stakeholders, particularly when compared to networks coordinated by municipalities (15.04 ± 5.34 packages, $p = 0.02$). There are no statistically significant differences in the other coordination strategies and the number of actors involved.

Second, local governments (that is, mayors and councilors) leading networks also tend to be devoted to a lower number of policy areas. On average, LGNs coordinated by specific management structures deal with 6.7 (SD = 4.7), a considerably higher number of policy areas when compared to LGNs coordinated by other stakeholders (M = 2.96; SD = 2.6) or by local governments (M = 1.2; SD = 0.76). Coordination seems to impact the capacity of LGNs to embrace complexity, with local government coordinated networks less likely to address a wide variety of tasks and activities. On the contrary, when coordination is put in the hands of (external) management structures, LGNs tend to be more predisposed to target cross-cutting problems. This is often associated with a higher commitment of actors involved, which may be crucial to increase the efficiency of such networks.

5. Concluding Remarks

LGNs are increasingly seen as the big idea to cope with issues that are complex enough in scope and scale to require a diversity of expertise and resources (Pope and Lewis 2008). Although the large bulk of research has focused on the benefits to be gained from exploiting LGNs, and hence scale economies, it has been largely confined to specific and institutionalized LGNs. This article departs from the recognition that ignition of such networks can produce relevant differences in terms of the diversity, intensity, and coordination of such local arrangements. This article sough to map the range of LGNs in a centralized country and assess the implication of different drivers in local government arrangements. These can range from national government-imposed rules (top-down arrangements) to collaborative endeavors that emerge to enhance local and regional development (bottom-up).

Overall, this research demonstrated that even in centralized countries, LGNs managed to pave their way, demonstrating high levels of vitality both in terms of the number and typology of actors involved and regarding the policy areas covered. While local governments are frequently regarded as the pivotal actors within these LGNs, central government directives emerge as crucial in igniting LGNs, particularly in smaller and less densely populated municipalities. The role of national governments, however, emerges as a significant burden both in terms of the number of policy areas tackled by LGNs and the number of local stakeholders involved. Moreover, the lower engagement of a wide variety of local stakeholders in terms of the management structures, and instead the tendency to rely on local governments for the management of such arrangements, potentially hinders the commitment of other stakeholders. In the long run, the centralization of management

structures in the hands of political and public actors may discourage other stakeholders' participation.

This effect of centrally driven networks is potentially counterbalanced by the positive effect of national governments in triggering the intensity of LGNs. The intensity of interactions of centrally driven networks tend to be higher. Potentially, national governments seem to be aware of the need to enhance mutual trust amongst local stakeholders, reducing transaction costs and promoting a closer involvement in the collaboration (Feiock and Scholz 2009; Hawkins 2010).

Local governance arrangements may be a brave new world, where all relevant stakeholders strive to ensure that the denser institutional fabric is able to effectively work. There is, however, a brave new world for academics as well, both in terms of the theoretical and empirical endeavors. While the centralization of power emerged as the relevant variable for the case selection, it becomes of paramount relevance to map and characterize the inner workings of LGNs in contexts with different settings. Hence, a relevant future avenue of research pertains to the analysis of the capacity of decentralized systems to enable the participation of a set of diverse local political and social structures. Moreover, by focusing on institutional and external aspects of cooperation, through the formation of governance arrangements at a local (municipal) scale, crucial aspects concerning the roles of local leaderships are largely disregarded. Mayors carry a decisive weight in most part of the processes of forging links between LGNs, and promoting effective orientation to local politics, particularly in the case of highly centralized countries.

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Notes

1 This research was developed under the frame of the research project "DECIDE: Decentralized Territorial Governance—coordination, capacity and accountability in local governance arrangements in complex regional settings"—http://decide.web.ua.pt/ (accessed on 17 April 2023).

2 As mentioned in the website from the Eurostat (n.d.), NUTS stands for Nomenclature of Territorial Units for Statistics, which "…is a hierarchical system for dividing up the economic territory of the EU and the UK". In Portugal, there are three NUTS 1 (Portugal mainland and the Autonomous Regions of Madeira and Azores), 7 NUTS 2 (5 regions in the mainland Portugal—North, Centre, Lisbon Metropolitan Area, Alentejo and Algarve—and the 2 mentioned autonomous regions), 25 NUTS III (clusters of municipalities), and 308 NUTS IV (the existing municipalities).

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Local Governments Facing Turbulence: Robust Governance and Institutional Capacities

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Abstract: Crisis environments, which are becoming systemic, pose significant challenges to local governments. The present study sought to present an academic contribution by introducing an analytical framework designed to scrutinize the institutional capabilities of local governance bodies in effectively responding to the emergent structural nature of crises within contemporary contexts. The study centered its attention on the concept of robust governance and accentuated a collection of factors that facilitate proficient public administration: contingency planning capacity, analytical capacity, organizational management capacity, and collaborative capacity. The paper presented a broad analysis of academic literature on the subject and it defined an analytical model for assessing local government capacities to deal with crises. One of the achievements of this work was the identification of key indicators that elucidate the institutional capabilities of local government bodies in addressing crisis environments. Through the examination of these indicators, the suggested analytical framework offers a comprehensive methodology for evaluating the readiness of municipal authorities in dealing with crisis situations. Furthermore, it enables comparative analysis of local government systems in analogous contexts, facilitating the identification of exemplary strategies for enhancing crisis management. The analytical model needs to be validated in further empirical studies.

Keywords: local government strategies; crisis environments; governance robustness; institutional capacities; effective local governance; evaluation; indicators analytical model

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1. Introduction

1.1. Paper Scope and Structure

Climate change, energy, pandemic crisis, economic and social crises or migration, among others, are examples of the significant public issues that pose challenges to public governance in modern societies (Geddes et al. 2012; Falco and Kleinhans 2018). These issues often transcend political and administrative boundaries, presenting complex and evolving challenges for local government worldwide. Local environments, where the manifestation of these crises is particularly intense, require institutional and organizational characteristics that enable local governments to tackle crises with the highest probability of success (Schomaker and Bauer 2020).

The objectives of this paper are threefold. First, this paper aims to explore how turbulence and crises impact local governments and local public administrations. Second, it seeks to examine the concept of governance robustness and its prerequisites for sustainable local government strategies to cope with systemic crises. Finally, this paper intends to outline an analytical model that can evaluate the capacities of local government strategies in handling crises. The paper presents a broad analysis of academic literature on the subject and it defines an analytical model for assessing local government capacities to deal with crises. The main academic contribution of this paper was the design of an analytical model of key indicators affecting these institutional capacities of local government. The application of this organizational and institutional evaluation model offers an all-encompassing

methodology to assess the preparedness of local governments to cope with crisis situations. The model can provide insights into the effectiveness of different approaches, and it can help policymakers and administrators develop more effective crisis management strategies and policies. Future studies are needed to explore the application of the analytical model and this will enable researchers to identify the strengths and weaknesses of the model and refine it accordingly.

In order to make substantive contributions both in theory and practice, this paper is organized into the subsequent sections: Firstly, the next subsection reflects on the challenges posed by crisis environments to local government strategies. The second section introduces the theoretical framework of institutional capabilities for local government in turbulent environments. In the third section, we present our analytical model for the evaluation of local government robustness strategies. Finally, the conclusion section reflects on the strengths and weaknesses of the model and calls for future research in this area.

1.2. Crisis Environments as a Challenge for Local Governments

Local governments are facing a growing number of crises that are becoming systemic, posing significant challenges to their governance. These crises can range from environmental disasters to public health emergencies, economic recessions, social unrest, and energy crises among others. In the context of a local government, a crisis can be comprehensively defined as a combination of circumstances that significantly threatens the established institutional stability. This occurrence is characterized by its potential to disrupt the normal functioning of the local government, imposing severe challenges to its capacity in addressing public needs and delivering essential services. Such crises demand immediate attention and decisive actions, often placing substantial pressure on local authorities to devise effective and agile responses to mitigate adverse consequences and restore operational coherence. The implications of a crisis on a local government can be far-reaching, encompassing aspects such as public trust, resource allocation, and policy implementation, requiring an adaptive and coordinated approach to safeguarding the integrity of the institution and fostering resilience in the face of unforeseen disturbances. Crisis situations bring us closer to what in political science are called "critical junctures", which denote a period characterized by an accumulation of factors, events, or decisions that together engender a profound and enduring impact on the trajectory of policy development and implementation. Critical junctures possess the potency to bring about fundamental shifts in policy paradigms, institutional arrangements, and societal norms, thereby altering the prevailing path-dependence of policymaking. Such junctures are often marked by heightened uncertainty, contested interests, and the reconfiguration of power dynamics, leading to the emergence of new policy ideas or frameworks. These situations act as causal forces that propel transformative changes in public policy and evolution within public institutions.

Such challenges are complex and multifaceted, requiring a coordinated and effective response from local governments to mitigate their impact and prevent further damage. This context is not new for public sector organizations, which have traditionally experienced changes in turbulent environments. Changes are understood as 'situations where events, demands, and supports interact and change with high variability, inconsistency, and through unexpected and unpredictable pathways' (Ansell and Trondal 2018). What is new is the consolidation of such turbulence as a habitual, enduring, and not simply transitory characteristic of the environment in which public organizations operate (Scognamiglio et al. 2022).

One of the main challenges that local governments face when dealing with crises is the need to adapt quickly to change circumstances. Systemic crises are dynamic and unpredictable and require local governments to be agile in their response (Parker et al. 2020). In addition, they often require local governments to work collaboratively with other levels of government and stakeholders in the community to ensure that resources are used effectively and efficiently (Ohta et al. 2021). Furthermore, local governments must develop a comprehensive understanding of the crisis, including its causes, consequences,

and potential risks. They must also be able to communicate this information clearly and effectively to the public and other stakeholders to ensure that everyone is informed and engaged in the response. This requires strong communication and coordination mechanisms that can be deployed quickly in crises (Yang et al. 2022). Local governments must also be able to mobilize resources quickly to respond to crises. This includes financial and other resources such as personnel, equipment, and technology. Local governments need to have contingency plans in place that can be activated quickly in crises to ensure that they have the necessary resources to respond effectively (Keyes et al. 2022). Finally, local governments should be able to learn from their experiences in crises and apply these lessons to future crises. This requires a culture of continuous improvement and learning, where local governments are constantly evaluating their response to crises and identifying areas for improvement (Usoro and Razzak 2021; Yigitcanlar et al. 2021). By doing so, they can build greater resilience and better prepare for future crises.

These characteristics are essential to building a local government that is responsive, efficient, and inclusive, and that can meet the evolving needs of citizens. However, crises in the local environment pose significant challenges to local government strategies, requiring them to adapt and evolve to respond effectively:

First, crises can exacerbate existing social and economic inequalities, impacting the effectiveness of local government strategies. For example, public health emergencies such as COVID-19 have disproportionately affected marginalized communities, highlighting the need for local government strategies to be inclusive and equitable in their approach (Pierce et al. 2021).

Second, crises require local governments to be agile and adaptive in their response, which can be challenging for bureaucratic and hierarchical governance structures (Ramió 2022). Local government strategies need to incorporate flexible and responsive governance mechanisms that can be quickly activated in crises.

Third, crises require strong communication and coordination mechanisms, both within the local government and with external stakeholders. Local government strategies must prioritize the development of effective communication channels and collaboration mechanisms that can be deployed quickly in crises (Jiang et al. 2020).

Fourth, crises require local governments to mobilize resources quickly and effectively (Park et al. 2022). Local government strategies need to incorporate contingency planning and resource mobilization mechanisms that can be quickly activated in crises.

Fifth, crises require local governments to develop a comprehensive understanding of the crisis and its potential risks and consequences. Local government strategies need to incorporate data analysis and risk assessment mechanisms that can provide accurate and timely information about crises (Curran and Smart 2020).

Finally, crises can disrupt the data infrastructure, which is crucial to local government strategies (Kanbara and Shaw 2021). For example, natural disasters or cyberattacks can cause data breaches or loss, making it difficult to collect, process, and analyze data. In such situations, local governments must develop alternative methods for collecting and analyzing data to make informed decisions (Mees et al. 2019).

2. Theoretical Framework: Institutional Capabilities for Local Government in Turbulent Environments

2.1. Robustness and Robust Governance

It is relevant to analyze how local governments may be generating the aforementioned types of responses in terms of adaptation and development of new capabilities to face the contexts of turbulence. In the development of these types of responses within the realm of public policy and management, concepts such as policy robustness or governance robustness have emerged strongly (Ansell et al. 2022; Capano and Toth 2022; Trondal et al. 2021; Capano and Woo 2018; Ferraro et al. 2015). The inclusion of the term robustness serves to mark differences in relation to resilience, which is widely used when considering strategies developed to address more cyclical crisis moments, in order to incorporate a

certain combination of permanence and transformation aimed at offering new responses to environments characterized by turbulence (Elston and Bel 2022; Capano and Woo 2017; Duit 2016; Ansell et al. 2015).

The application of the term robustness in the field of governance has been proposed in terms of a deliberate endeavor to foster effective problem-solving through the strategic establishment of institutional structure, offering mechanisms and procedures that facilitate adaptable adjustment to challenging circumstances and innovative exploration and exploitation of emerging possibilities (Ansell et al. 2021). Following this approach, the development of robust governance as a strategy to generate new responses to the turbulent environment requires impacting both the organizational design and the dynamics that may promote the behaviour of the actors in accordance with the transformation model being pursued (Capano and Toth 2022; Gofen and Lotta 2021).

The contributions made from different academic perspectives allow one to characterize the concept of robustness. In political science, the idea of robustness is proposed as the ability of a system to invent and reinvent public policies when facing new challenges, responding dynamically (Howlett and Ramesh 2023; Sørensen and Ansell 2021; Howlett et al. 2018). From a local government perspective, the need to define and deploy robust strategies that enable facing turbulence while continuing to create public value through versatile adaptation, adjustment, and pragmatic redirection of governance solutions is highlighted (Ansell et al. 2021). From a managerial perspective, attention is focused on configuring flexible organizations based, among others, on collaboration networks and decentralized responses (Ansell et al. 2021; Capano and Woo 2018). Boswell et al. (2022) emphasized the importance of communication and citizen involvement in designing robust governance to face new challenges (such as climate change, for example).

Based on these approaches, the distinctive feature of the concept of robustness is the ability to achieve a balance between stability and change. Following Ansell et al., robust governance systems need to be capable of adapting to maintain their functionality despite crisis environment; however, in order to accomplish this, they must furnish the framework and infrastructure that aid in sustaining and engendering change (change necessitates stability) (Ansell et al. 2022). In this sense of the concept of robustness, stability should not be understood as rigidity but as the persistence over time of a function or objective, beyond the challenges that arise. However, the maintenance of this function or objective is likely not to occur in its original form, but it can be revised, expanded, or redefined according to changing circumstances. Similarly, change should not be conceived merely as reactive or incremental, with a will to restore the previous situation, but as an innovative and proactive character orientated towards achieving flexible adaptation that takes advantage of the opportunities of turbulence to revise previous dynamics. In other words, robustness is associated with a local governmental character that is orientated towards exploring unforeseen developments from turbulence (Scognamiglio et al. 2022).

2.2. Local Government Strategies for Robust Governance

The concept of "local government" used herein refers to a distinct level of government within a political system that operates at the subnational level, encompassing territorial subdivisions such as municipalities, counties, or districts. Rooted in the principles of decentralization, local government exercises a measure of administrative autonomy and possesses defined responsibilities for providing essential public services, implementing policies, and addressing local community needs. Operating within the framework of national or regional laws, local governments are entrusted with decision-making authority over matters pertaining to local infrastructure, public safety, education, healthcare, and other essential services. As an integral component of multi-level governance, local governments play a pivotal role in enhancing democratic participation, fostering community engagement, and promoting responsive policymaking, thereby facilitating the efficient delivery of services tailored to the distinct demands and preferences of specific geographic areas.

The analytical model proposed in this paper aimed to evaluate how medium or large local governments deal with crisis situations, taking into account their institutional capacity, resource allocation, and strategic planning. This model proved particularly suitable for such local government entities due to their established administrative structures, greater resource endowment, and enhanced capacity for self-organization. Medium and large local governments typically possess the requisite bureaucratic machinery, human capital, and financial resources that enable them to swiftly mobilize and coordinate responses to crisis events, thereby effectively addressing emergent challenges. Moreover, their organizational infrastructure fosters a collaboration with diverse stakeholders, facilitating the adoption of comprehensive and targeted crisis management strategies. However, while the model can offer valuable insights in the context of medium or large local governments, its application to small municipalities may be less fruitful. These smaller entities, constrained by limited resource capacity and organizational complexity, often encounter impediments in mounting effective responses to crises. Their restricted financial resources may hinder the implementation of robust contingency plans, and their narrower administrative setup might compromise the efficacy of crisis coordination efforts.

The role of local government in crisis environments requires certain strategies associated with both its institutional design and behaviour in relation to the actors involved in the different lines of public action. In the first approach (Capano and Toth 2022), in order to face turbulent environments, it is necessary: (a) to have proactivity (to anticipate scenarios), (b) to have agility in responses offered both in the short- and medium-term, (c) to have flexibility to adjust behaviours as well as to relocate strategic resources, and (d) to develop rapid learning of new knowledge that can be immediately applied to the situation being faced.

Following the argument previously presented, current organizational paradigms in public administrations do not allow these requirements to be adequately met, making it necessary to deploy strategies that promote them. From various contributions, a series of strategies have been proposed to develop robust governance (Howlett and Ramesh 2023; Capano and Toth 2022; Carstensen et al. 2022; Ansell et al. 2021; Chandra and Paras 2021; Capano and Woo 2018; Duit 2016), among which the following stand out.

1. Scalability is understood as the flexibility to mobilize and demobilize resources, or to reassign them according to the identified needs at each moment, in an agile manner and aligned with the organization's objectives. The flexibility strategy can also incorporate resources from the organization itself or from actors in the environment who are involved in developing responses to turbulence. The development of this strategy requires the generation of trust among the different actors involved, both internally, with reference to different professional groups, and externally, with the network of agents involved in the proposed responses.
2. Experimentation with reference to the exploration and testing of solutions that generates knowledge to configure alternatives' final design to face challenges. This strategy is associated with the development of prototypes of new responses that can be evaluated through testing and reviews before their eventual extension. Considering the temporal challenge of robust governance, short-term responses to face turbulence can also be considered experiments, overcoming incrementalism logic, and deploying tactics to build strategy.
3. The transformation of organizational relationship models (both internal and external), based on coordinated autonomy and the idea of polycentricity, aims to achieve a new distribution of competencies and functions to facilitate a shared commitment. The objective is to promote the emergence of innovative proposals from different actors of the network and encourage their involvement. This strategy proposes to complement autonomy with coordination, which allows for the identification of the most appropriate responses and, eventually, their generalization for the rest of the actors involved.

4. The promotion of adaptability of norms, preserving the safeguarding of values and stability they provide, but avoiding rigidity and delay in offering new responses. This strategy deploys the balance between stability and change that characterizes robust governance. This strategy implies the continuous evaluation of rules to ensure their validity and added value, simplifying the regulatory framework by eliminating those that no longer add value, and updating the most relevant ones. Additionally, there is also a proposal to encourage the discretion of managers and professionals to interpret the rules, but always based on an adequate understanding of their purpose and the values they imply.
5. Encouragement and training to generate innovative responses, that is, to develop skills for improvisation and rapid learning. This strategy includes stimulating thinking that goes beyond the framework established by the predominant dynamics in the organization (thinking outside the box), for example, by incorporating experts with heterogeneous profiles that facilitate the contrast of perspectives. A strategy that also includes the promotion of improvisation, and overcoming environments with excessive regulation or protocols that restrict individual discretion. Along the same line, the strategy can also incorporate rapid learning, with institutional designs aimed at promoting research, reflection, monitoring, and evaluation focused on continuous improvement to learn from the results obtained and the processes that led to them (report culture).

All these strategies to develop robust governance are not exclusive but complementary, and their development depends on several factors (such as public organizational context and situation, the nature of crisis, leadership, resources, among others) that must be analyzed to evaluate their capacity to face turbulence.

3. An Evaluative Framework for Appraising the Robustness of Local Government

3.1. Institutional Capacities for Local Government Robustness

Strategies described in the previous section emphasize an organization's ability to adapt to the challenges posed by turbulence rather than just facing them or recovering from them. The deployment of these strategies in local governments reveals their interconnections, highlighting their complementarity and the need to combine them according to the organizational reality or the nature of the turbulence to be faced.

Our analytical proposal posits that to tackle the challenge of crisis environments, local governments must deploy institutional capabilities that reinforce them to identify the problems, select appropriate strategies to cope with them, articulate these alternatives, and measure their impact (Knill et al. 2020; Wu et al. 2017). The analytical model presented in this section seeks to address the following inquiry: What institutional capacities should be in place as prerequisites to promote consistent strategies to cope with crisis environments? The presented argument underscores the significance of four institutional capabilities that influence the institutional framework of local government actions: contingency planning capacity, analytical and data management capacity, organizational management capacity, and collaborative or network management capacity. In order to evaluate these capacities at the local level, our model delineates various essential indicators that provide insights into the existence of these components.

As the United Nations Development Program (UNDP) points out, institutional capacity denotes an institution's ability to: "(a) perform its activities consistently, manage changes and crises, and maintain performance over time, (b) offer responses that can enhance its areas of operation, and (c) provide a framework for developing the required change" (UNDP 2021). Various academic perspectives exist for analyzing the capacities of public organizations. A preliminary classification discerns between those focusing on public policies and the associated network of stakeholders, and those emphasizing the attributes of public institutions. This investigation introduces the notion of institutional capacity, which integrates both perspectives and evaluates them from the standpoint of local administration.

The notion of governance capacity exemplifies notions associated with the public policy approach and the system of actors, encompassing the array of systemic and organizational resources essential for policymaking and its implementation (Ramesh et al. 2016; Howlett and Ramesh 2016). In addition, the concept of policy capacity denotes the availability, quality, and nature of resources that facilitate the scrutiny of policies, evaluation of policy options and their ramifications, and promote strategic decision process (Howlett 2015). Moore's classification of policy capacities (Moore 1995), which is enshrined in the model by Wu, Ramesh, and Howlett (Wu et al. 2017), recognizes three primary capabilities, namely analytical, operational (or managerial), and political. These competencies comprise resources that can be classified into the individual, organizational, and systemic domains. Consequently, the traditional analytical framework used in public policy analysis arises from the combination among the three categories of capabilities.

The integration of insights derived from the aforementioned perspectives enables the identification of institutional capacities of local governments to address the challenges associated with formulating, implementing, and assessing policies and programs in turbulent environments. Our analytical model departs from four crucial capacities that have been emphasized by the academic literature adapted to the local government context: strategic contingency planning capacity, analytical capacity, organizational management capacity, and collaborative capacity.

The first is contingency planning capacity, which refers to a strategic management instrument used to prepare for potential future events or crises. It involves a structured and systematic approach to identify and evaluate risks, vulnerabilities, and potential impacts on an organization's operations, services, and stakeholders. This form of planning facilitates the formulation of alternative courses of action, in case the primary strategy cannot be executed as planned, and includes measures to mitigate, respond, and recover from adverse effects. Strategic contingency planning is an ongoing process that involves continuous monitoring and assessment of the environment, and the implementation of revisions to strategies and plans as necessary. This approach is particularly important in volatile and uncertain environments, where unforeseen events can have significant consequences on an organization's operations, reputation, and sustainability (Pearce and Zahra 1992). To achieve this objective, politicians and public managers must combine precision in goal setting with suitable elaboration at the operational level, affecting all levels of the organization (Howlett and Walker 2012). The formulation of planning and leadership strategies is grounded in robust information frameworks, which are likewise associated with analytical proficiency. This facilitates the formulation of agile and adaptable proposals that foster learning and innovation, as described by Mayne et al. as a "reflective-improvement capability" (Mayne et al. 2020).

Analytical capacity, the second one, can be related to effectively acquire, manage, and utilize diverse kinds of data and evidence to enrich the decision-making process and enhance public action through acquiring enhanced understanding of the external context, internal circumstances, and performance outcomes (Mayne et al. 2020). This capacity entails crucial components, such as having professionals with the necessary skills. These professionals should also be related to a central advisory entity (Ramesh et al. 2016; Ramió 2018). Moreover, the organization needs to establish an appropriate organizational structure and guarantee the presence of tools and procedures to acquire and process data and information and, subsequently, disseminate and utilize them. Information systems that are linked to data collection, processing, analysis, and presentation in various formats to different audiences play a critical role in sustaining analytical capacity (Salvador and Ramió 2020).

The effective analytical capacity should lead to the implementation of data governance. While the literature provides various interpretations of data governance, there is a general agreement that it involves: (1) recognizing data as an organizational asset that requires management, (2) establishing influential responsibilities and associated responsibilities, and (3) enforcing principles and benchmarks that ensure data quality and proper utilization

(Otto 2011a). Accordingly, data governance is linked to organizational systems that allocate decision-making responsibilities in alignment with the organization's priorities, promoting correct behaviours that recognize data processing as a crucial asset for the organization (Otto 2011b). The technological organizational structure, and human resources, in terms of expertise and knowledge, are both essential to this end. In turbulent environments, data can be a critical resource for informing decision-making, resource allocation, and operational planning. Effective data governance in turbulent environments requires a clear understanding of the types of data that are necessary and relevant for addressing the specific challenges of the crisis, as well as the sources, quality, and integrity of that data. This involves establishing mechanisms for data collection, storage, sharing, and secure analysis, efficient, and interoperable (Choenni et al. 2022). Additionally, data governance in these environments requires the development of contingency plans for unexpected disruptions to data systems and processes.

Organizational management capacity involves effectively coordinating of resources and activities to achieve strategic objectives (Otto 2011b). This capability is linked to "pragmatic leadership theory" (Hofstad and Vedeld 2021; Antonakis and House 2014) and encompasses the management of administrative structures, budgets, human resources, and organizational systems. In this capability, within the framework of a local crisis, the initial concern pertains to the establishment of adaptable organizational frameworks and the anticipation of roles dedicated to risk management. The subsequent concern relates to organizational procedures and dynamics, emphasizing their alignment with the imperatives of agile responses. The third issue relates to human resource management, including internal information systems and communication policies related to risk management, as well as socialization and learning dynamics in this area.

Collaborative capacity is associated with the skills required to foster network activities that involve external actors in the promotion of public action. This capability is associated with the efforts of cities to involve and inspire diverse interrelated actors, encompassing private enterprises and civil society organizations (Hofstad and Vedeld 2021; Antonakis and House 2014). Effective deployment of this capacity in crisis environments entails the creation and quick distribution of exchange of information among the actors engaged in the network, coordination, and shared decision-making protocols to collaboratively tackle pressing challenges. The assessment of this capability is predicated on its extent in terms of comprehensiveness (taking into account the number and nature of involved actors, both internal and external) and the depth of the reciprocal exchange relationships among them (Mayne et al. 2020). Collaborative capacity must also encompass the generation of dynamics that involve citizens, the sharing of responsibilities, and the establishment of common objectives, wherein public administrators serve as facilitators of networked interaction and mutual learning, fostering innovation, augmenting operational capability, and enhancing the legitimacy of public action during times of crisis (Torney 2018). This can be encouraged through inclusive participatory mechanisms that promote the integration of the citizen perspective in the decision-making process. Lastly, the capacity for collaboration necessitates the establishment of a transparency and accountability framework in order to be able to account for the actions taken to address the crisis.

The four capacities described have distinct impacts on the strategies and activities facing a crisis environment, but they are mutually dependent on one another. Consequently, they should be viewed as an integrated whole that, through their interplay, serves as a prerequisite that reinforces local authorities to improve governance framework to tackle the issues posed by the local crisis.

3.2. Identification of Indicators for Each Analyzed Institutional Variable

To establish an analytical framework and assess these capacities at the local level, our model suggests a set of key indicators for each capacity. Each of the proposed indicators is, in turn, an enabler of one of the five local government strategies for robust governance

described in Section 2.2 of the paper (Scalability, Experimentation, Polycentricity, Norm adaptability, and Learning).

Variable 1. Contingency planning capacity
Indicators:
1.1. Contingency planning and protocols: Existence of contingency plans or protocols for crises that prioritize the development of anti-crisis actions over the execution of routine plans or programs.

This indicator identifies the existence of contingency plans or protocols for crises. Such plans prioritize the development of anti-crisis actions over the execution of routine plans or programs. The development of such plans enables local governments to proactively respond to crises, ensuring the continuity of essential services, minimizing damage, and reducing the impact of the crisis on the local community (Cotterill et al. 2020). As both planning and protocols inform about resource redistribution and reflect knowledge derived from previous tests and prototypes, this indicator is closely related to both scalability and experimentation local government strategies for robust governance. An example of contingency plans or protocols is the existence of plans against cyber-attacks. These plans encompass comprehensive strategies and protocols designed to safeguard information systems, networks, and critical infrastructures from malicious digital intrusions. Rooted in the principles of cybersecurity, these plans integrate proactive measures, incident response protocols, and risk management frameworks to bolster resilience against cyber threats. By adopting a multi-layered approach and fostering collaboration between stakeholders, plans against cyber-attacks seek to mitigate the adverse impact of cyber incidents and ensure the protection, confidentiality, and integrity of sensitive information in the digital realm.

1.2. Policymakers trained in risk management: Existence of policymakers with training and/or experience in risk management or crisis management.

This indicator identifies the existence of risk and crisis management experience in the organization's structure. Policymakers with training or experience in risk management or crisis management are essential due to the critical role they play in developing and implementing effective policies and procedures to face it (Abdullah and Kim 2020). The existence of such policymakers informs local government capacities to identify potential risks and develop strategies to mitigate them. Furthermore, they can develop contingency plans and protocols for crisis situations, thereby ensuring that they are well prepared to handle any unexpected events that may occur. Due to content and dynamics associated with training and/or experience in risk management, this indicator is a key factor to inform about learning local government strategy. To operationalize this indicator, for example, an exhaustive study of the educational and experiential profile of the public institution's managers can be carried out.

1.3. Economic resource allocation: Budget linked to contingency plans to sustain anti-crisis actions.

The indicator focuses on the degree of flexibility about economic resources choices. Specifically, it evaluates the extent to which sufficient resources are allocated to anti-crisis-planning action programs, highlighting the prioritization of such allocations. The indicator serves to identify the capacity to effectively mobilize resources, particularly through the prioritization of adequate economic resources for the implementation of programs (Obrenovic et al. 2020). The existence of economic resources linked to contingency plans is essential to all local government anti-crisis strategies and as an indicator, it especially related to scalability strategy for robust governance. To inform this indicator, we can identify defined budget lines to deal with contingencies, or the existence of streamlined processes or protocols to establish these budget lines in case of need.

Variable 2. Analytical capacity
Indicators:
2.1. Organizational Data Units: Specialized data analysis departments, staffed with sufficient personnel.

Data are a crucial component of enhanced decision-making processes and the advancement of public action to combat crises. This indicator serves to identify the presence of a specialized organizational unit or professional team equipped with analytical skills, sufficient resources, and appropriate levels of organizational support. By offering comprehension into the capacity of public organizations to acquire, handle, and employ data and evidence from various sources, this indicator facilitates an understanding of the extent to which a team of skilled professionals, legitimized across organizational hierarchies, can contribute to this effort (Golubetskaya and Kurlov 2021; Picciotto 2020). Due to the role related to specialized data analysis and management units in terms of knowledge sharing and promotion and supervision activities, this indicator informs about coordinated autonomy strategies of local government for robust governance. An example of operationalization of this indicator is the detection of municipal data analysis offices or the organizational foresight of management figures such as the chief data officer.

2.2. The information system: Availability of a robust information system that effectively acquires, processes, disseminates, and leverages data and information.

This indicator identifies the presence of reliable information systems that support data collection, processing, analysis, and presentation in appropriate formats to diverse stakeholders, thereby promoting analytical capacity. It aligns with a key variable highlighted in the academic literature concerning the development of planning and leadership strategies grounded in robust information structures. This affords flexibility and adaptability, enabling learning and adjustments in public policies at the local level. Overall, this indicator provides insight into the existence of an effective organizational architecture that supports redundant systems that can be activated in the event of a data infrastructure disruption (Fathollahzadeh et al. 2021). Even if the availability of a robust information system is essential for all local government strategies, scalability becomes one of the highlighted initiatives to be informed by this indicator. The existence of applications specifically designed to support these information systems is an example that operationalize this indicator.

2.3. Data-driven decisions: Presence of organizational processes that enable data-informed decision-making aligned with anti-crisis policy objectives.

This indicator assesses the capacity of an organization to generate its own data, drawing from diverse departments and external actors, and to establish systematic processes that enable decision-making based on these data and evidences. An essential element in assessing analytical capacity lies in establishing guidelines and standards that ensure the quality of data and appropriate utilization (Otto 2011a). The existence and results of data-driven decision-making processes is a key indicator to inform about local government strategies such as developing skills for improvisation and rapid learning and to enhance relationships model (both internal and external) for robust governance. The existence of "situation rooms", which promote the sharing of data and decisions in a cross-cutting manner, is a clear example of the operationalization of this indicator.

Variable 3. Organizational management capacity

Indicators:

3.1. Coordination systems: Presence of mechanisms for coordination, negotiation, and information exchange among internal units that foster interdisciplinary initiatives, aiming to formulate novel strategies and monitor implemented actions.

This assesses the capacity of an organization to respond to the requirements of its anti-crisis strategy by evaluating its internal processes and dynamics. It measures the ability of different units to adapt and streamline their activities to promote the development of cross-cutting policy actions in turbulent environments (Goren et al. 2022). This indicator provides insight into the organization's coordination and communication abilities and how effective is the collaboration between units. This indicator is essential to inform about coordination autonomy strategies for robust governance. The presence of transversal commission or committee represents, for example, a dynamic and inclusive mechanism that fosters interdepartmental collaboration and coordination in addressing complex and multifaceted issues

that transcend the purview of individual administrative units. This committee functions as a platform for various departments, agencies, and stakeholders to converge, pooling their expertise and resources to collectively tackle challenges that necessitate a comprehensive, cross-cutting approach. By fostering horizontal communication and synergy, a transversal commission facilitates the integration of diverse perspectives, streamlines decision-making processes, and enhances the efficacy of policy implementation.

3.2. Flexible personnel management: The presence of initiatives concerning communication, training, and skill enhancement linked to risk management, and adaptability in terms of personnel allocation according to the emergence of unforeseen needs.

The effective management of risk in local government requires specific actions aimed at improving communication systems, education, and the improvement of capacities related with risk management and adaptability (Dolamore et al. 2020). This indicator highlights the importance of such actions and how they contribute to ensure that the appropriate volume of human resources is allocated to address unforeseen needs. This includes the recognition of key skills and the introduction of programs aimed at improving these skills among staff, as well as the provision of appropriate personnel to support crisis response. The development of such actions can support the establishment a culture of robustness within local government organizations, promoting effective decision making and enhancing the overall capacity to manage risk. Flexible personnel management concreted in the abovementioned actions is a key indicator for local government strategies such as scalability and learning, and also to encourage innovative responses. The operationalization of this indicator involves identifying initiatives that enable, for example, the resizing or relocation of personnel in cases of necessity. Having the ability to adjust the workforce size or redistribute personnel to areas of higher demand ensures that essential services can be efficiently delivered and critical functions adequately staffed. Additionally, resizing or relocating personnel can optimize resource allocation, preventing redundancies and improving overall operational efficiency.

3.3. Regulatory flexibility: The ability to adapt norms and regulations to the needs arising from the crisis.

This indicator highlights the importance of the governments' capacity to adjust the legal framework to respond effectively to the crisis. The ability to adapt to changing situations is key to ensure that regulations are not a hindrance but rather a facilitator in addressing the challenges posed by a crisis. It is necessary to establish mechanisms that allow for a flexible response and adaptation to the specific circumstances of each situation. The regulatory framework must be designed in a way that enables it to be modified quickly to respond to the challenges presented by crises (Picciotto 2020), while maintaining its coherence and consistency with the overall objectives of the policy. Effective communication with stakeholders and citizens is also crucial to ensure that regulatory changes are understood and implemented correctly. This indicator is essential to inform about norm adaptability robust governance strategy that aims to safeguard of values and stability they provide, but avoiding rigidity. One way to operationalize this indicator is to identify regulations that allow, in exceptional situations, the modification of procedures or deadlines. For example, enabling exceptional modalities of public procurement in the context of crisis.

3.4. Encouraging experimentation: Existence of experimental programs integrated into management strategies, such as pilot tests, living labs, or experiments.

This indicator assesses whether local governments have implemented such experimental programs in a systemic way as part of their management strategies, and if they are integrated into their policy-making processes. Experimental programs allow local governments to develop and test new solutions in real-life situations, which can lead to better problem-solving approaches and improve service delivery (Nesti 2018). The integration of such programs into management strategies ensures that they are used to their full potential and their outcomes are applied systematically. The existence of such programs is,

therefore, a crucial indicator of the local government's innovation capacity and its readiness to engage in experimentation and innovation in a dynamic and evolving environment, as local government strategies for robust governance. Examples of operationalizing this indicator include the existence of innolabs or protocols for prototyping new public services. Innolabs, as collaborative spaces dedicated to experimentation and problem-solving, offer local governments a platform to explore novel approaches, technologies, and service delivery models, thereby catalyzing the development of cutting-edge solutions to complex societal challenges. Through systematic protocols for prototyping new public services, local governments can test and refine ideas in controlled environments, minimizing risks and resource wastage while maximizing the effectiveness of policy interventions.

Variable 4. Collaborative capacity
Indicators:
4.1. The administration of external networks: The presence of a clear and articulated approach to managing the network of external actors to be able to quickly coordinate anti-crisis actions.

This indicator analyzes the public organization capability to manage the network of external actors effectively. This is achieved through establishing communication channels with different organizations, including public, private, and third-sector actors, for the exchange of ideas and best practices that can be applied to the development of local anti-crisis initiatives (Dolamore et al. 2020). The concrete evidences of this indicator inform about transformation of organizational relationship models strategy for robust governance. The operationalization of this indicator involves identifying, for example, the allocation of responsibilities in the relational management of stakeholder networks or the definition of protocols for external relations, as well as the provision of guidelines for generating administrative agreements within the framework of multi-level governance.

4.2. Citizen participation and accountability: Participatory mechanism as antennae or sensors of situations that could lead to social crises and to face it and presence of systems for accountability and transparency in the design, implementation, and evaluation of anti-crisis actions.

This indicator evaluates the organizational ability to integrate citizens' perceptions and evaluations into the diagnosis and policy design. In this regard, the collaborative capability encompass the establishment of strategies that engage citizens and the generation of agreed objectives. The promotion of participation strategies that encourage the integration of citizen viewpoint in the policy process reinforces this approach. Therefore, a transparent governance model is necessary to promote this critical perspective, while promoting the legitimacy of government action despite the crisis (Schmidt and Wood 2019). As in the previous case, this indicator is essential to provide evidences of organizational relationship model changes as local government strategy for robust governance. Examples of operationalizing this indicator include the existence of open-participation mechanisms such as sectoral roundtables, establishing deliberative systems such as minipublics, defining digital platforms for citizen deliberation, or creating spaces to promote transparency and accountability.

The proposed analytical framework (sintetized in Table 1) aims to validate the capacity of local government to deal with crisis situations. Through the set of indicators described in the previous section, the analytical framework allows us to identify how each of the four institutional capacities has contributed to the local government's ability to design, execute, and assess effective anti-crisis policy actions. While these capacities do not guarantee the success of such policies, they represent a necessary prerequisite for local governments to address the challenges generated by turbulent environments.

Table 1. Variables and indicators for robust governance institutional capacities.

Variable/Indicator	Description
Variable 1. Contingency planning capacity	
1.1. Contingency planning and protocols	Existence of contingency plans or protocols for crises that prioritize the development of anti-crisis actions over the execution of routine plans or programs
1.2. Policymakers trained in risk management	Existence of policymakers with training and/or experience in risk management or crisis management
1.3. Economic resource allocation	Budget linked to contingency plans to sustain anti-crisis actions
Variable 2. Analytical capacity	
2.1. Organizational Data Units	Specialized data analysis departments, staffed with sufficient personnel
2.2. The information system	Availability of a robust information system that effectively acquires, processes, disseminates, and leverages data and information
2.3. Data-driven decisions	Presence of organizational processes that enable data-informed decision-making aligned with anti-crisis policy objectives
Variable 3. Organizational management capacity	
3.1. Coordination systems	Presence of mechanisms for coordination, negotiation, and information exchange among internal units that foster interdisciplinary initiatives, aiming to formulate novel strategies and monitor implemented actions
3.2. Flexible personnel management	Presence of initiatives concerning communication, training, and skill enhancement linked to risk management, and adaptability in terms of personnel allocation according to the emergence needs
3.3. Regulatory flexibility	The ability to adapt norms and regulations to the needs arising from the crisis
3.4. Encouraging experimentation	Existence of experimental programs integrated into management strategies: pilot tests, living labs, experiments
Variable 4. Collaborative capacity	
4.1. Administration of external networks	The presence of a clear and articulated approach to managing the network of external actors to be able to quickly coordinate anti-crisis actions
4.2. Citizen participation and accountability	Participatory mechanism as antennae or sensors of situations that could lead to social crises and systems for accountability and transparency in the design, implementation, and evaluation of anti-crisis actions

In order to test the analytical framework based on the identified indicators, we propose to employ a qualitative approach through the development of case studies. A case study is a comprehensive system that investigates a research topic within its contextual setting (Byrne and Ragin 2009), chosen as a typical example due to the nature of the research questions (Yin 2009). In this type of study, the focus is to examine a specific system, namely, the anti-crisis strategy promoted by a local administration, through an in-depth collection of data from various sources, such as policy documents, strategic action plans, monitoring and evaluation reports, and web-based information systems, in addition to conducting in-depth interview, and group meetings. Through this approach, a detailed and analytical description of the object of study was produced in line with the research objectives of the institutional capacities (Creswell 2018).

4. Conclusions

Local governments must deal with an environment where crises are increasingly persistent. Turbulent environments present substantial difficulties to local governance policies. They require local governments to be agile, adaptive, inclusive, and equitable in their approach, with flexible and responsive governance mechanisms in place. Strong communication and collaboration mechanisms, contingency planning, and resource mobilization mechanisms are also crucial. Local government strategies must incorporate data analysis and risk assessment mechanisms to provide accurate and timely information about crises. By doing so, local governments can develop effective crisis management strategies and ensure the safety and well-being of their communities.

The proposed analytical framework provided relevant insights to inform about local government capacities to deal with crisis situations. Through the set of indicators described in the previous section, the analytical framework allowed us to identify how each of the four institutional capacities has contributed to the local government's ability to design, execute, and assess effective anti-crisis policy actions. While these capabilities do not ensure the success of such policies, they embody an essential prerequisite for local governments to confront the challenges arising from crisis environments. The aim of this work was to construct this analytical framework for scrutinizing the institutional capabilities of local government systems in dealing with crisis environments. The study highlighted the need to explore the various capabilities that these systems possess, including contingency-planning capacity, analytical capacity, organizational-management capacity, and collaborative capacity. In doing so, the paper contributed to the body of knowledge on crisis management in the sphere of local governments. The institutional model presented in this paper provided a valuable tool for evaluating local government robustness. By considering the organizational and institutional characteristics of the system, the model allowed us to identify areas of strength and weakness and provided insights into the effectiveness of different strategies and policies. Furthermore, it can be employed to evaluate the performance of local government systems in comparison to other systems in analogous contexts and ascertain exemplary approaches for enhancing crisis management.

One of the notable contributions of this study was the discernment of key indicators that impact the institutional capabilities of local government systems. These include the availability of technological infrastructure, the quality of human resources, and the effectiveness of the governance framework. Through the analysis of these indicators, the proposed analytical framework offers a comprehensive approach to evaluate the readiness of local governments in addressing crisis. Crisis environments require local governments to structure a comprehensive view of the crisis environments and its potential risks and consequences. In our analysis, we attempted to define and study how local government strategies need to incorporate data analysis and risk assessment mechanisms that can provide accurate and timely responses to crisis situations.

Our model was designed for medium or large local governments, due to their established administrative structures, greater resource endowment, and enhanced capacity for self-organization. However, its application to small municipalities may be less fruitful, because of the limited resource capacity and organizational complexity. Consequently, the model's suitability for assessing responsiveness in medium or large local governments cannot be readily extrapolated to small municipalities, warranting a contextualized and tailored approach when evaluating crisis management dynamics in such contexts.

A key aspect we would like to emphasize is that as an integral component of multi-level governance, local governments play a pivotal role in enhancing democratic participation, fostering community engagement, and promoting responsive policymaking, thereby facilitating the efficient delivery of services tailored to the distinct demands and preferences of specific geographic areas. We, therefore, tried to consider in our analysis the importance of the multilevel governance logic in which local government is immersed through the identification of relational management capacities in multilevel environments. Through indicators such as those relating to our variable 4 "Collaborative capacity", we identified

the presence of a clear and articulated approach to managing the network of external actors in a multilevel governance context. However, it should be noted that this model was designed to assess the capacities of a local institution, not to measure the capacity of a sectoral network to respond to a crisis situation, which would require another type of analytical approach closer to policy network analysis.

Although the proposed analytical framework has the potential to contribute significantly to the field of crisis management, further research will be necessary to validate and improve its effectiveness. While institutional capacities are prerequisites for effective anti-crisis policy at the local level, their impact on the success of these policies requires further investigation. Future research can build upon this study by validating the proposed framework and identifying areas for improvement. Finally, the goal is to apply this analytical model to enhance the preparedness of local government systems in addressing crises, thereby contributing to the safety and wellbeing of society through robust governance responses.

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Article

The Tick Issue as a Reflection of Society–Nature Relations: Localized Perspectives, Health Issues and Personal Responsibility—A Multi-Actor Sociological Survey in a Rural Region (The Argonne Region, France)

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Abstract: Ticks are acarids that can transmit diseases, such as Lyme borreliosis, to human beings. They have often been considered from an ecological perspective (the environments in which they live) or from a medical one (diagnosis and treatment), while relational approaches to human–tick encounters that integrate the social sciences have remained less common. This article opts for a socio-territorial approach and a cross-analysis of different groups of actors faced with tick risk in a rural environment during their professional or leisure activities: foresters, farmers, hunters, environmentalists and hikers. The paper is based on observations and about thirty sociological interviews conducted in 2021–2022 in the rural Argonne region (France). The survey reveals the interconnection and tension between three types of approach to tick-related issues, i.e., a localized approach (based on a knowledge of place as well as everyday uses), a health-centered approach (medical knowledge as transformed and shaped by the respondents' own experiences of tick-borne disease) and an emphasis on taking personal responsibility instead of collective preventive health initiatives or awareness campaigns (as to the location of "tick areas" or of protective measures).

Keywords: tick risk; Lyme disease; society–nature relations; socio-ecological change; rurality; hunting; forestry; farming; outdoor leisure activities; knowledge/perceptions/social practices

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1. Introduction: Toward a Relational and Socio-Spatial Approach to Human–Tick Interactions

Ticks are acarids that can be found in natural environments all over the world[1]. They feed on the blood of the hosts that they attach themselves to[2] (game, rodents, etc.). In Europe—where one of the most frequently found species is *Ixodes ricinus*—as well as in North America, they become carriers of the Borrelia bacterium if the host animals are infected; in particular, they can then transmit Lyme disease to human beings, inducing neurological, articular or cardiac disorders that can be severe and persistent and that have fueled debate in the medical field as to the existence of a "chronic" form of the disease (Forestier et al. 2018).

The social sciences have admittedly paid scant attention to tick-related issues as compared with other academic disciplines (Quine et al. 2011). For example, in a bibliometric study of the academic articles published in North America up until 2016, based on eight different databases, Judy Greig et al. (2018, pp. 248–49) found 2,258 articles on the subject, among which only 8.9% (202 articles) dealt with the knowledge on, attitudes to and perceptions of tick-borne diseases, while 32.6% analyzed the effectiveness of current screening tests, thus reflecting the primacy of a medical approach to the subject.

However, zoonotic diseases, which are transmitted from vertebrate animals to human beings, present major health threats and scientific and policy challenges, as they give rise to narratives that have social and political "lives" (Leach and Scoones 2013); the temporal, spatial and social differences that can be observed in the way these diseases are spread preclude the use of any single, reproducible model.

As a result, there may be a sense that there is a gap between the biological and medical knowledge derived from scientific research and the perceptions of the public, including the social groups that are the most concerned. This feeling has been compounded by ongoing debate among scientists, doctors and patients about the "social construction" of Lyme disease (Aronowitz 1991). Abigail A. Dumes (2020) has explored the conflicts that have arisen in the United States over claims about "chronic" Lyme disease and formulated the notion of "divided bodies": the experience of the patient can be found to be in conflict with scientific, medical or social perceptions and become the basis for a battle of legitimacy between these different groups to impose their truth.

Similarly, from an environmental health perspective, a bibliometric analysis of the use of the "One Health" approach in articles published between 2003 and 2021, based on the Scopus database, i.e., 12,815 articles, reveals that scientific and technical approaches have remained prevalent over social sciences approaches (Miao et al. 2022). However, an integrated approach to risk assessment requires that attention be paid to the interactions between socio-behavioral factors and ecological factors in order to inform tick-borne disease management (Bouchard et al. 2023). In this respect, we are dealing with a relational issue: "The risk of contracting Lyme disease varies geographically due to variability in ecological characteristics that determine the hazard (the densities of infected host-seeking ticks) and vulnerability of the human population determined by their knowledge and adoption of preventive behaviors" (Bouchard et al. 2023, p. 1).

Therefore, preventive health programs cannot avoid taking into account the social, spatial and local epidemiological context (Aenishaenslin et al. 2015; Bouchard et al. 2019), all the more as individuals' lifestyles may have differing effects on their health, depending on the individuals' practices (Vallée et al. 2010). One conclusion can be derived from this: a relational approach is necessarily based on the study of the socio-spatial context.

That is why we have chosen to adopt a socio-territorial approach, enabling us to reconsider previous medical and ecological interpretations by exploring the concrete sites of human–tick encounters. This need has been convincingly argued in the literature. First, the vegetation can only be considered as indicative of tick activity at the local, rather than the macrospatial, scale when considering physiognomic features (forests, pastures. . .) (Gilot et al. 1994). Second, it is impossible to assess the risk of tick-borne disease by merely looking at the density of infected ticks without taking into account the perceptions and practices of residents and users in the areas concerned. Studies have not uncommonly noted that there is a low level of preventive health behavior in regions where the measured risk of Lyme disease appears to be high (Aenishaenslin et al. 2022). A study conducted in the United States in Michigan, Minnesota and Wisconsin, where tick-borne diseases are a major issue, also observed that there was a discrepancy between the respondents' very high awareness of these diseases (no less than 98% of the sample had heard about them) and their lack of realization that they could be directly exposed to the threat in their close environment (25%) (Beck et al. 2022).

A second lesson emerges from that: researchers focus their attention "not so much on representative as on specific environments, combining parameters that are likely to have an impact on tick density and infection rates" (Massart 2016, p. 25). We are looking at areas where tick reservoirs (fauna) abound and at the users of such spaces. The studies and methods mobilized are representative, but not in a statistical sense of the term, because they address the specificities of the environments studied and the residential knowledge (Kohler 2012) that provides the link between individual and configurational factors.

Although no systematic data are currently available on a European scale (Van Den Wijngaard et al. 2017), some climate scenarios predict the expansion of the tick range over

the continent. By 2040–2060, a 3.8% overall habitat enlargement is anticipated for ticks of the *Ixodes ricinus* species; but this does not take into account the impact of socio-economic changes (Semenza and Suk 2018). This leads to the third framing principle for our research: one essential challenge lies precisely in understanding better the interactions between ecosystem changes and the climate, i.e., connecting them with resource use and social practices, which are themselves changing (Lambin et al. 2010), knowing that risk factors are correlated with the local environments. For instance, in eastern Europe, Sarah Randolph observed a significant increase in tick-borne encephalitis during the 1990s, which she linked to changing poverty rates and to the socio-economic upheavals following the fall of "popular democracies"; the development of leisure activities and tourism increased the risk of human–tick encounters (Randolph 2001; Randolph 2011).

The tick issue thus reveals the transformations in the relations between society and nature as well as of society's reflection on itself, as shown for instance by the construction of specific relations to and the perceptions of tick bite risk. Environmental psychology has shown that these perceptions depend on individuals' lived experiences and on their spatial character; for instance, the natural areas or types of vegetation in which they occurred. They are therefore socio-spatial perceptions, not just collective ones. In this sense, there is no single, homogeneous system of risk perceptions. On the contrary, risk perceptions reflect both the relation of each individual or group with their environment and their personal and localized background (Dernat and Johany 2019b, pp. 19, 23–24). Public health messages therefore cannot be delivered without understanding localized social perceptions and practices in order to reach specific audiences. Starting from a psychological perspective, this fourth general conclusion drawn from the literature also calls for the use of sociological tools to go further.

2. A State of the Art: Sociologizing the Tick Issue

From the existing literature in the social sciences, sociology in particular, we draw the following research frameworks and questions, which we will link together from a relational perspective.

First, two PhD dissertations have been defended in France on the subject of ticks and tick-borne diseases: one in the field of geography and the other in sociology. The first one develops a spatial and environmental analysis, which has traditionally been the favored approach in geography, and asks how prevention measures might better target forest users, taking better into account the sites and modes of human–tick encounters (Méha 2013). The second dissertation focuses on Lyme disease by surveying the arenas of expertise and related "practitioners" (Massart 2013). Both partly survey the same site—the forest of Sénart, in the Paris region—to study the conditions of human–tick encounters. They both show that sociological analysis is essential to define the notion of tick risk: in such situations, the groups concerned are involved in the process (rather than simply being exposed to risk). Two possible, potentially conflicting, research perspectives result from this: first, the need to delve into the social context; namely, into individuals' socially embedded knowledge, practices etc.; second, the need for research about how to design effective public action through management initiatives, regulations or public policies (Méha 2013; Massart 2013). Both directions require taking local contexts into account, which justifies embracing a socio-territorial approach.

Second, in her PhD dissertation, Clémence Massart points out that Lyme disease can be understood as "an intermediate case, defined both by a process of emerging media coverage which is turning it into a controversial issue, diffusely but permanently and increasingly present in the public space, and by another definitional dynamic by which it is framed as a health issue defined by scientists alone, in the shadow of the mainstream audience. Between these two dynamics, the influence is neither linear nor univocal" (Massart 2013, p. 18). This raises the following question: to what extent does the scientific construction of tick-borne disease have an impact on individuals' perceptions, if not practices? This question involves the study of three interrelated aspects: scientific or vernacular knowledge,

individuals' more- or less-established perceptions of ticks and tick-borne disease and their more- or less-localized uses. These three aspects provide us with an analytical framework that help to assess individuals' perceptions of increasing tick activity and tick risk and their preventive health behavior when exposed to tick risk in the context of professional or leisure activities. On this subject, the literature suggests that there is no systematic correlation between the gradual perception of risk and the correspondingly heightened precautions, as has been mentioned before (Aenishaenslin et al. 2022; Beck et al. 2022). The interest in taking a sociological approach is that it can reveal that "lay perceptions [. . .] are socially differentiated, influenced by 'optimism bias' and personal narratives" (Peretti-Watel et al. 2019). This second form of social embeddedness needs to be taken into account and linked to the local embeddedness we have noted above.

This leads to a third stage in our sociological reflection based on the existing literature: we need to reconsider the prevailing binary—ecological and medical—approach to tick-related issues. Clémence Massart (2013, pp. 32–34) views zoonotic diseases such as Lyme disease as "new environmental diseases [. . .] also favored by human activity but [whose] space of reference [is] nature. [. . .] These new environmental diseases also involve different target audiences and experts: instead of toxicologists and chemists, ecologists of wild populations are taking over while users of nature and professionals in farming and forestry are replacing local residents". She therefore suggests using the term "ecological diseases". This shows how important it is to consider together the substantive (*what* is at stake?) as well as procedural (*how* are they being dealt with?) aspects of health and environmental issues and their interrelations.

Scholars in the field of sociology have discussed the relations between ecologization and localization. Marc Mormont, in particular, has described the process of the "emergence of multiscalar territories resulting from widening emphasis on ecological issues" (Mormont 2009, p. 159). We embrace this double focus, paying attention to climate change as well as to localized individual practices, and link this to the need for a multiscale governance of sustainable development (Hamman 2020). In this fourth stage in the construction of our theoretical framework, the need for a relational analysis becomes even clearer. We need to recognize the role played by local knowledge, as underlined in the field of ethnoacarology (Herrera-Mares 2022). But this is not all: we more particularly pay attention to the connections between different forms of knowledge; for example, the possible tensions and porosity between expert and lay knowledge: their scope of validity and degree of "legitimacy" differ depending on the specific groups of actors, as shown by the study of social practices understood in their socio-spatial and socio-temporal contexts.

Focusing on an exemplary area, the Argonne region—a rural area located in eastern France that is widely affected by the presence of ticks—can help raise further questions from this sociological perspective. We advocate using a relational approach exploring different groups' local perceptions of ticks at the same time as their localized social practices in the face of tick risk. To sum up, the existing literature reveals the interconnection and tension between three types of approaches to tick-related issues, i.e., a localized approach (based on knowledge of place as well as everyday uses), a health-centered approach (shaped by individuals' relation to medical knowledge and to their own and others' lived experiences, especially of Lyme disease) and an emphasis on taking personal responsibility (in assessing tick-bite risk or adopting adequate preventive health behavior). This signals a "governmentalization" of tick-related issues, as defined by Michel Foucault (Foucault 1991): the emphasis on personal responsibility raises questions about society's and the collective responsibility, about the role of socio-economic and local area development models and the role of public health action. Interestingly, the aspects of content (who the hosts are, what sites are most favorable for tick activity, what policies or human activities there are that may have encouraged their proliferation, etc.) are still not well established (see the above-mentioned controversy over a "chronic" form of Lyme disease). They cannot be analyzed separately from procedural aspects (how?) if we mean to rethink these from an ecosystemic perspective of human/non-human relations (in forestry, hunting or farming or

in outdoor leisure activities) as well as preventive health measures and policies and their social reception.

Using this sociological approach, we can go beyond socio-cognitive perspectives that aim to determine adequate preventive health behavior. They are widely represented in the literature (Bayles et al. 2013; Butler et al. 2016; Zöldi et al. 2017), especially focusing on what awareness-raising strategies on the subject of Lyme disease would most effectively impact personal behavior (Quine et al. 2011, pp. 2016–17). However, as Gavin Bridge and Thomas Perreault have underlined, "accounts of eco-governmentality show how resources, ecosystems and bodies (both human and non-human) are subject to calculative procedures and practices" (Bridge and Perreault 2009, p. 489).

Specifically, we intend to pay close attention to the complexity of the social context; this is the fifth stage in the construction of our theoretical and methodological framework. The significance of choosing the Argonne region as our survey area, compared to the "model forest" of Sénart studied by Christelle Méha (2013) and Clémence Massart (2013), is that it makes it possible to consider, at the same time, forest and open environments, users for professional (foresters, employees of hunters' federations, farmers etc.) and/or leisure purposes (hunters, members of local outdoor organizations, hikers etc.), i.e., to consider a wider and more complex range of possible human–tick encounters.

What is more, this also brings to the fore the role of some mediating actors that act as "go-betweens" (Hamman 2011) within the different professional and social groups concerned by tick-related issues in a given local area, and who even take part in the implementation of prevention policies or measures. As has been shown, "some forms of social exchange and transaction presuppose relationships based on sharing, reciprocal involvement, short-range solidarity [. . .], the mobilization of resources, of flexibilities and adaptations, the making of visibilities and legibilities, all of which are virtually impossible on a global scale. They presuppose dense communication and information networks, permanent (including physical) contact and a common experience that is more easily shared within a restricted environment" (Alvarenga 1994, p. 80). We take inspiration from this observation but also wish to go further by taking concretely into account the plurality of human and non-human mediations. We designed our methodological framework accordingly.

3. Materials and Methods

3.1. Fieldwork and Survey Design

The Argonne region is one of the most rural areas in France, with few communes over 500 inhabitants; over 60% of the area is covered by farmland and about 37% by forest[3]. This is interesting in two ways. First, it is therefore an ideal site to analyze the human–tick exposure as a possible consequence of the different uses of natural spaces. Second, it ensures the relevance of our case study. While the literature has so far mostly focused on periurban forests and on the urban encroachment on surrounding natural spaces, which is thereby increasing the likelihood of human–tick encounters (for example Randolph 2001; Méha 2013; Massart 2013), we are paying extensive attention to a rural area, so that our findings may also more broadly be applied to so-called "ultra-rural" spaces. Indeed, in the North-East of France, the Argonne region marks the start of the "diagonal of emptiness" (*diagonale du vide*), which stretches across France down to the Pyrénées mountains and is still emptying today (Oliveau and Doignon 2019).

We start from the following hypothesis: tick-borne pathogens circulate widely in forest ecosystems, and it has been shown that the relative proximity of a forest to a populated area increases the risk of exposure (De Keukeleire et al. 2015). It is therefore essential to explore this environment, as well as to compare it with open environments, farmland or grazing areas.

This is why we selected four survey sites, based on the territorial grid we used during our work with the *Zone Atelier Rurale Argonne* (ZARG[4]), with whom we have been engaged in a medium-term partnership: (1) the forest of Signy-l'Abbaye, (2) the Estate of Belval,

(3) the area of Montfaucon-d'Argonne and (4) the Belval Ponds Nature Reserve (Figure 1). The choice of these four survey sites ensures the validity and relevance of our case study since we were thus able to compare contrasted environments and to consider different types of actors and activities involved in the specific areas under study: respectively, (1) foresters at the *Office national des forêts* (ONF—the French national forests office) and representatives from the Ardennes hunters' federation; (2) hunters and forestry managers, active in closed environments; (3) farmers; and (4) sports, leisure and wildlife organizations, operating in open environments. Our survey was designed to combine a territorial approach (the study of four specific sites) with a scrutiny of the challenges of public action and measures taken to deal with tick risk (through interviews with representatives of the four groups surveyed).

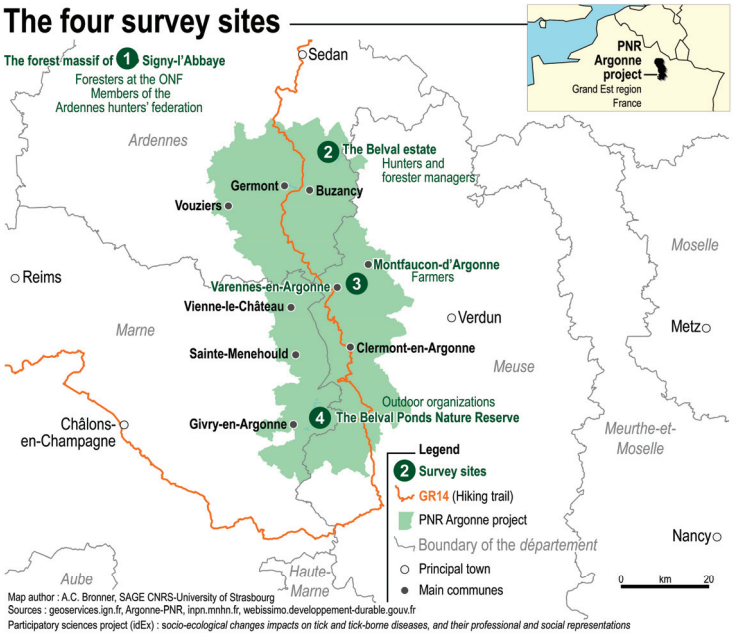

Figure 1. The four sites and social groups surveyed in the Argonne region.

The ZARG therefore provided a platform for facilitating contact with different actors involved in the Argonne region, enabling us to build upon the initial relationships we established and to put together our corpus. In order to ensure that all the people involved would be represented, we chose to follow an integrative approach in surveying representatives of the on-site organizations, who hold valuable knowledge, express the collective voice and can act as relays in the local area; in addition, so as not to confine ourselves to institutional discourse, we also interviewed several "grassroots" members, enabling us to capture different types of professional perspectives, uses and experiences from the ground.

Following an exploratory field visit in November 2021, we conducted 28 in-depth individual or collective sociological interviews up until, and including, the summer of 2022, supplemented by a few online interviews. In line with our sociological perspective, we aimed to grasp the knowledge, perceptions and practices among the different professional and social groups surveyed, as well as their uses of nature and the evolution of their perceptions over time. Based on these objectives, we subdivided our interview questionnaires into three sections, focused on (1) localized knowledge and experience; (2) health and medical knowledge; and (3) personal responsibility vs. public health measures.

We built our contact list by drawing on the partnerships established with the groups selected and thanks to mediating players. We used a similar approach in the four survey sites and among the four groups of actors selected (Table 1) to collect enough data for each site and group and to be able to compare them together.

Table 1. A cross-analysis of the different environments, groups of actors and types of material.

Environments	Groups of Actors	Empirical Material Collected
4 survey sites	First overview	Exploratory observations and contacts on-site and photographic material: fieldwork from 8–11 November 2021
Closed environments	Hunters	7 interviews + fieldwork from 7–9 December 2021 On-site participant observation on 16 February 2022: big-game hunt in a publicly owned forest
	Foresters	4 interviews + fieldwork from 18–20 May 2022 On-site participant observation on 19 May 2022: a typical working day of a forestry technician at the ONF
Open environments	Local sports, leisure and natural life organizations	7 interviews + fieldwork from 27–30 May 2022 On-site participant observation on 28–29 May 2022: three-day hiking journey in the Argonne region (*Grande Traversée de l'Argonne*)
	Farmers	5 interviews: 1st wave: fieldwork and on-farm observations from 4–8 July 2022 5 interviews: 2nd wave: fieldwork and on-farm observations from 15–19 August 2022. On-farm observations and collection of photographic material

In the case of the hunters, foresters and local organizations, we systematically interpreted their statements—which had been fully transcribed to allow for a thematical analysis—in reference to the ethnographic sequences during which they had been collected, as we took part in a big-game hunt in a publicly owned forest, accompanied a technician from the *Office national des forêts* in his daily activity and participated in a big local hiking event, the *Grande Traversée de l'Argonne.* From these three ethnographic immersions, we produced detailed accounts based on our logbooks.

In the case of the farmers, we adapted our methodology to the seasonal constraints (harvesting is required in the summer) and to their different types of activities (livestock breeding, grain growing, farm sanctuaries etc.) and organized our fieldwork in two sequences: in July and August 2022. This gave us the opportunity to conduct more interviews with the available farmers and to supplement them with data from on-farm observations.

These field immersions were, at the same time, an opportunity to observe the people in their daily activities, to become familiar with their environment and concrete practices and to gather a body of photographs making their experience visible, in order to confirm the interviewees' statements and establish the validity of our findings. Based on an inductive approach, we analyzed the interviews not only thematically—just as the interview questionnaire had been built around a few major topics based on a binary (ecological and health-related) approach to tick risk that we had identified from the outset—but we also endeavored to refer the interviews to our on-site observations and to adopt a similar methodology for all the groups surveyed.

3.2. Implementing the Relational Approach: Questioning Social Transactions and Boundary Work

Our survey methodology is original since it takes into account different types of environments as well as different groups of actors (Figure 2). Paying attention as it does to social ties and possible conflicts, our research makes a combined use of two theoretical approaches.

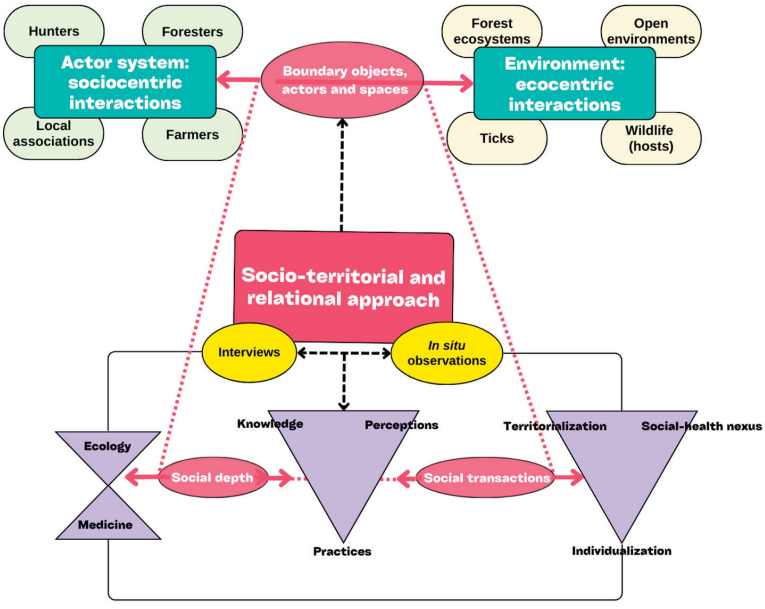

Figure 2. An overview of the survey methodology.

3.2.1. Building an Analysis upon Social Transactions: A Relational Approach between Interests and Values

First, we draw on the sociology of social transactions, i.e., the analysis of the processes by which practical compromises are worked out in concrete or even daily situations of "conflictual cooperation" (Hamman 2015). This is the case in the Argonne region, where different types of logics and uses—hunting, forestry and farming practices as well as nature-based leisure activities—may partly overlap or be mutually exclusive. Individuals' social and professional relations to ticks are embedded in their socio-spatial reality.

Constantly bearing in mind the multiplicity of actors, processes and issues involved in a localized configuration, we are thus able to pay close attention to the social relations and possible tensions resulting from the different uses and logic at play. One of the main principles of the sociology of social transactions is that the different stakeholders involved should not be simplistically considered as likeminded, rational agents: "The complex relationships between agents, and the multiplicity of their goals, lead them to invent compromises for coexistence that result from a game of social transaction" (Remy et al. 2020, p. 15). The different actors' perceptions and practices are made up of their relations to different interests (economic, social, professional) and values (their attachment to the rural world, to the environment, to health etc.). The actors' interiorized conceptions have an influence and manifest themselves in formal and informal ways, through expressions of trust or distrust (Remy et al. 2020).

3.2.2. Bridging an Analysis through a "Boundary Work" Frame

Second, we also use the notion of "boundary objects", defined by Susan L. Star and James R. Griesemer as objects that are both flexible and materially consistent enough to support communication between distinct, intersecting cultural worlds (Star and Griesemer 1989, p. 393). The issues at stake are permanently being reframed as these objects are being used or dismissed, depending on the current evolutions, by actors endowed with different (scientific, environmental, practical) expertise. This notion can shed light on the complex configurations created around ticks. Clémence Massart demonstrated its value for studying

Lyme disease and the disputes about its diagnosis and treatment among different medical specialists, the techniques for its detection or the involvement of patient organizations (Massart 2013, pp. 269–358).

Some aspects have been, however, little explored, such as the shaping of an "invisible infrastructure" embodied in mediating figures (Bowker and Star 2000), which convey a set of conventions and commanding common practices—for instance, the attention a hunter pays to his dogs in order to assess tick risk. We are more particularly interested in the localized forms of this infrastructure.

3.2.3. A Socio-Territorial Approach at the Crossroads of the Two Paradigms

Taken together, the two paradigms are useful in formulating and exploring the notion of "boundary spaces", i.e., interstitial spaces, bringing together different—human and non-human—actors and different interests, whose interactions are made possible by territorial transactions.

The notion of boundary spaces has been used in the history and sociology of scientific knowledge: for instance, Robert E. Kohler (2012) described the "border zone" between laboratory science and field science. This notion has also been developed in the sociology of territory to draw attention to the fact that boundaries are not only lines to be crossed but spaces with social characteristics of their own. In these interstitial spaces, different actors and different perspectives come into contact, and these oppose or hybridize through territorial transactions.

In this respect, to grasp different social groups' perceptions and practices in the face of tick risk, we need to understand the "dynamics of negotiation between objects of representation" from a systemic point of view (Dernat and Johany 2019a, p. 14). Boundary objects are permanently involved in their daily activities. It is by considering both boundary objects and boundary spaces that we can develop a new configurational approach to tick-borne disease prevention, "giving greater importance to the local area and environment in which people live" (Dernat and Johany 2019a, p. 16). The focus is thus made to move from ticks—which "may lead one to concentrate on the acarid itself rather than on its social and environmental integration"—to tick bites—a health-related/medical approach— and then to tick risk, which opens the way for a more holistic perspective, integrating "questions related to animals, to outdoor practices, and of course, to space and the environment" (Dernat and Johany 2019a, pp. 16–17). We situate this paper at this third level. It requires a relational approach in order to understand the relations and conflicts between social groups but also to grasp how their knowledge, perceptions and practices are being shaped by localized conceptions, health imperatives and the calls on taking personal responsibility in the face of tick risk (Figure 2).

4. Results and Discussion

Using the Argonne region as an example, we propose a sociological and relational reconsideration of the prevalent ecological (4.1) and medical (4.2) approaches to tick-related research, emphasizing the individual and social perceptions informing the actors' concrete points of view. This will help better understand the social practices they display (4.3) when it comes to their preventive health behavior: personal responsibility seems to prevail over collective regulatory initiatives or intensive awareness campaigns. This result reflects a deep-rooted attachment to the positive values associated with natural spaces.

4.1. Localized Perceptions of Tick Risk: The Importance of the Socio-Environmental Context

Actors' localized relations to ticks are not shaped through the incorporation of authoritative ecological or medical narratives coming from above. On the contrary, they are local constructions of boundary spaces, shaped through interactions with other residents. All the respondents referred to their confrontation with ticks as a shared experience. A technician at the ONF declared: "Real bites, I think I get between one and three on average every year. But if you're talking about picking up ticks [. . .] when it's the season, I'll pick up 30 or 40 a

week" (interview, 20 May 2022). A hunter and the representative of a sports organization, respectively, added: "I think [it concerns] everybody: hunters, strollers, anyone that goes into the forest, in all the countryside" (interview, 15 February 2022); "We live in a very wooded and natural region, so we're always confronted to this. When we go mountain biking too" (interview, 9 May 2022).

These locally rooted perceptions raise questions, in particular, about a possible increase in tick activity and provide a basis for the actors' explanations of the phenomenon, in between ecologically and socially centered explanations for the extension of "tick areas".

4.1.1. A Longer Tick Season?

"Peak tick season" is in spring and autumn: "It's often in spring and autumn, that's when we do a lot of practice in the woods" (the head of a sports organization, interview, 9 May 2022). As a result of the cycle of seasons, ticks become a recurring issue, as suggested by a forester from the ONF: "When you don't see ticks for weeks, then the problem no longer exists in your head. And then, one day, you come back from work with seven ticks on your leg and then you think, 'ah, this is a real issue, we've got to talk about it!'" (interview, 15 June 2022).

We are talking here of perceptions, and they need to be further explored. First, they are shaped by a combination of factors. For example, while some of the hunters surveyed declared that there was stronger tick activity in the summer than in the winter, this was not only due to their seasonal impressions but also to the fact that less protective clothing is worn in the summer, as suggested by one hunter: "I feel more at risk in summer. There's tick activity but I also think we wear lighter clothing and I've been bitten twice!" (interview, 22 March 2022). Then, some think that the increase in tick activity all year long is a more marked process today than it was in the past. This is clearly expressed by the manager of a private forest estate:

> "Let's take my dog as an example: before, it was treated in the spring, we knew that dogs got ticks between March and October-November and that in winter we were safe. It's not like that anymore. Dogs have to be treated almost all year long, otherwise they get ticks in the middle of winter". (interview, 3 March 2022)

Tick risk perceptions are thus shaped by a dual relation to time, short-term seasonal impressions and the perception of changes over the medium term.

4.1.2. What Reasons Have Been Given for the High Presence of Ticks in the Argonne Region?

In this context, the actors surveyed gave two main explanations for the high presence of ticks in the Argonne region: climate change and the proliferation of wildlife. This raises questions about the social transactions made between the perception of exogenous and endogenous factors, especially human beings' actions.

The first explanation insists on the impact of climate change, in line with the scientific literature on the subject. For example, some geoscientists have sought to identify tick-borne encephalitis virus microfoci in neighboring Germany for the purpose of predictive mapping; the two variables with the highest contribution to the model are linked to the environment and the climate, i.e., multi-annual evapotranspiration and multi-annual hot days, followed by recorded minimum air temperature (Borde et al. 2022). More generally speaking, it has been underlined in New Hampshire in the United States that "risk perceptions are closely associated with knowledge of climate change's impact on vector-borne disease" (Bolin 2022, p. 31).

Such explanations are endorsed by the groups surveyed in the Argonne region. Among others, a technician at the ONF working in a state-owned forest explained that current tree species are threatened both by bark beetles (Figure 3) and by ash dieback, which ultimately favors tick hosts, whether reforestation policies are carried out or not:

> "Spruces: bark beetle attacks! [. . .] To replace spruce, we're reforesting with Douglas fir. . . Spruce is no problem, it doesn't attract. [. . .] On the other hand,

> Douglas fir is the main food for deer. . . [. . .] All the ash trees along the river banks are dead, precisely because the fungus has developed better. [. . .] There aren't necessarily any trees to take over, so the herbaceous vegetation explodes, which favors the spread of ticks. [. . .] On plots with ash trees with ash dieback, as soon as they come into the light, there are ticks for you!". (interview, 20 May 2022)

(**a**) (**b**)

Figure 3. A spruce forest in the Argonne region that has become vulnerable to climate change following a bark beetle invasion, encouraging the spread of ticks. When storms are not knocking down the weakened trees (**b**), foresters are cutting down the affected plots to contain the pockets of contamination (**a**). (Photographs by Aude Dziebowski, UMR SAGE, 19 May 2022).

Hunter representatives also concurred in pointing to the impact of climate change. Two heads of a hunters' federation thus agreed:

> "– I think it's global warming. [. . .]
>
> – It is an undeniable fact that 1° there are no longer any cold winters, 2° there are more hosts [i.e., animals that harbor ticks].
>
> – Yes! [. . .] There's one thing for sure, global warming brings with it longer periods when ticks are present.
>
> – Absolutely!". (interview, 8 December 2021)

The farmers surveyed similarly mentioned climate change as an explanation; for example: "The main link, it has to be said, is climate change! [. . .] [Ticks] also need damp areas to proliferate" (interview, 6 July 2022).

This has become a widely held opinion. Yet, this has not spread through the influence of scientific studies establishing the fact that climate change does have an impact on the expansion of tick range and the increase in tick bite risk (such as Ostfeld and Brunner 2015). For the respondents, the insights gained on the ground outweigh knowledge that is not rooted in direct perception, as a forester at the ONF explained:

> "The forest of [X], one summer when it was really really hot, with fern tall like this and a rather clear forest stand—so it might not at all match what was said during the lecture [a lecture on ticks he attended]—but after I came back, there were something like 40 ticks! Which means spending one or two hours with a tick remover". (interview, 20 May 2022)

The respondents often distanced themselves from generalized "expert" knowledge. They always insisted on the fact that their views were localized and based on experience defining a concrete boundary space, which means that they could easily recognize their limitations when there was a lack of material evidence. One example is provided by an officer from the ONF, when he referred to the influence of light in the undergrowth on tick populations:

> "The impact of sunlight on ticks with clearcutting every 30 years... Clear cuts here only correspond to regeneration plots. It's hard to say whether there are more stands in the light now than with coppice cutting in high forest, you'd have to make calculations I've never made". (interview, 20 May 2022)

Climatic factors thus seem to be preferred as an explanation because the issue then appears to lie outside the scope of the local actors, unrelated to their interactions and possible conflicts about the upkeep and legitimate uses of the forest and natural spaces. That is why some of the people involved in local community organizations are not satisfied with this exogenous explanation, which removes responsibility from the local actors for their farming, forestry or hunting practices. For instance: "We've always had ticks. There were fewer than today, [...] but you can't blame everything on climate change. [...] Do I make a link, yes and no, 'cause we tend to always make a link with climate change about everything" (interview, 9 May 2022). Forests are thus boundary spaces where social transactions are being continually negotiated regarding the legitimate modes of expression.

A second reason is frequently given for the proliferation of ticks: the comeback of wildlife species, which can be hosts to them. Ticks are undeniably present on game today in the Argonne region. A technician at the ONF related a significant episode, which he dated from the autumn of 2017, involving a poached stag (Figure 4). The corpse presented a very high number of ticks and the stag's head (which is sometimes considered as a trophy by poachers) had been confiscated and placed in a car, which led to memorable moments when it came to getting rid of the ticks:

> "There had been poaching during the rutting season. [...] In the end we confiscated the head of the stag. [...] We'd tied a knot in the bag, we carried the head, it lasted 20 min, but there were ticks all over the car! [...] I had to go to a pharmacy to get an acaricide and I had to use it all weekend on the car. When I opened the car on Monday, there were dead ticks everywhere: on the seat, on the dashboard, everywhere! I had to take out all the clothes, shake everything out, empty and clean everything". (interview, 20 May 2022)

Figure 4. The head of a poached stag: the black spots are ticks, which are widely present on big game animals in the Argonne region (photograph by Romuald Weiss, a technician at the ONF).

Many respondents mentioned the correlation between the presence of big game and ticks in the region. The head of a hunters' federation asked: "This idea has been cropping up: couldn't it also be due to the increase in wildlife?" (interview, 8 December 2021). A forester working in a private estate shared the same view: "For me, today, the main challenge is to control big-game populations!" (interview, 3 March 2022). In a similar way, during a hike, we observed that the road verges had been turned over by wild boar. A farmer we interviewed explained the practical solutions he had found: "This happens when the grain becomes milky and doughy, wild boar love it! To avoid this, we sow bearded wheat because the beard scratches their throat. That's a clever trick, except that bearded wheat does not have the best yield. But we have no other choice" (interview, 6 July

2022). The wheat field is a boundary space between men and wildlife, where partial and ever-renewed transactions are always being negotiated, such as the practical compromise found by the farmer.

Through the tensions and compromises involved, these concerns about big-game populations specifically suggest a third way to approach the issue of tick expansion. It is now generally accepted that human-induced climate change plays a role in increasing the risk of tick-borne disease. Sarah Randolph has shown that while the analysis of climate records since 1970 has revealed abrupt temperature increases just prior to the dramatic upsurge in tick-borne encephalitis (TBE) incidence in many parts of central Europe, this pattern of climate change does not account for the marked heterogeneity in the timing and degree of TBE upsurge in different areas within the Baltic countries. The author, instead, points to a range of abiotic and biotic environmental factors, together with changes in socio-economic conditions (Randolph 2011). To explore further the interactions between human beings and the environment, we should not just consider the macrosocial scale. Our fieldwork shows in greater detail that the question of human impact is a source of conflict between the different groups present in the same area which makes its understanding more complex at the same time as it demonstrates the human-made nature of the phenomena under study.

In the Argonne region, while it can be argued that there is a link between the proliferation of big game and tick expansion, the representative of a sports and leisure organization suggested that the responsibility largely lay in human choices and practices, and explicitly pointed to the hunters: "They are big tick carriers: wild boar are proliferating, and there is a huge number of deer and roe deer. [. . .] Hunters keep game populations up because they feed them. And shooting plans are very restrictive, especially for big game like deer" (interview, 9 May 2022).

The practice of feeding wildlife is a particular source of debate. A farmer pointed out to what is a fact: "[The hunters] feed the wild animals in the area. [. . .] And they feed them very very well" (interview, 5 July 2022). Another farmer underlined the permanent transactional confrontation between different perceptions. The practice of feeding wildlife can thus be understood as a boundary object between forest and farming spaces, between men and animals and between animals and ticks:

> "There are two schools. Those who think that feeding wild animals is a good way to concentrate wild boar in the same place and to define a better shooting plan: you bring them together to avoid excessive breeding. Then, there are those who think that it just means providing them with good and the population is going to increase even faster. I think there's a middle ground between the two views. But you can't say that feeding wild animals is a good or a bad thing". (interview, 17 August 2022)

A forestry technician suggested that the practice of baiting game increased tick presence:

> "Where did I pick up ticks this week? I've got a machine running, it's in a patch of beech trees, there's very little vegetation, [. . ..] we followed in the wake of the machines and it was enough to pick up ticks. It was not far from an old feeding area. [. . .] The animals know about the feeding areas and they always make the round". (interview, 20 May 2022)

A volunteer from an environmental and heritage organization considered that the presence of wild boar was indicative of human intervention. When attempts are made to correct this through so-called wildlife regulation measures, these give rise to a vicious circle, attesting to the underlying influence of socially based realities:

> "Wild boar proliferating, well we all can see the road verges being turned over. No doubt about that [. . .]. But I think that this business of correcting imbalances, when you kill the natural predators of some animals, you eradicate foxes because they're harmful [. . .] you keep on destroying the balance". (interview, 12 April 2022)

The feeding of wild game can thus be considered a boundary object in the conflicts between actors involved in the same area. A technician from a hunters' federation thus took issue at length with the fact that the current practices should cause concentrations of wildlife, taking up one by one the arguments used by the various parties:

> "Where the landowners allow feeding, the way we do it is codified [. . .] we have to declare it, it is controlled. [. . .] It is talked about from a technical point of view, people say it encourages reproduction. That's not true! Really not true because the volume of food that's provided cannot change the physiognomy of the animal. [. . ..] It's a false debate. On the other hand, there is an ethical debate. It's based on morals: it's not good to feed a wild animal. [. . .] We have no problem with that in the hunting world, where we believe that nature is on our side. But there are [. . .] some people who always want things to be whiter than white. [. . .] Now what causes concentrations is not feeding the animals, [. . .] it's the wild boar population: they're gregarious animals, gathering around the females, and then the males gather around. [. . .] I tend to think that morals is one thing, regulations are another and factual and technical elements are something else again". (interview, 9 December 2021)

On the other hand, some argue that the development of leisure and tourism activities is likely to make human–tick encounters more frequent by causing changes in social behavior (Randolph 2001, 2011), as a hunter suggests: "What I think is that there is a huge development in green outdoor activities and that [. . ..] this is necessarily going to lead to more exposure and incidents, more tick bites" (interview, 22 March 2022).

In this context, rather than hesitating between environmental and social explanations, some respondents have developed a systemic theory. Their main point is that promoting biodiversity would help contain tick expansion:

> "I'm no scientist but what I think is the more birds there are, the more different animals there are, the stronger the immune system of the forest. [. . .] The more diversity there is, the more capacity there is for resistance and for erasing the effects of tick concentration". (interview of a forester, 24 March 2022)

> "Would that be an interesting idea to explore, to say: are meadows where there is no hedge, no copse, meadows where ticks multiply more and can't we see this at our very small scale? Because we have a population of wild birds: we also have swallows, sparrows, buzzards. . .." (interview of a farmer, 19 August 2022)

Here again, direct and localized perceptions are mobilized to provide the concrete proof of a correlation between biodiversity loss and the upsurge in cases of zoonotic diseases in human beings (Lesne 2021, p. 251).

What can be seen is that while some consider their relation to the environment in a systemic way, others have a more sector-based approach. This is important to consider when designing health awareness campaigns. A study of the communication tools focusing on Lyme disease aimed at rural and urban populations in Canada revealed that to increase the uptake of adaptive health and environmental behaviors, the communication messages had to be tailored to their specific audience: for some audiences, bridging climate change and health, while for others, strategically decoupling them (Cameron et al. 2021). Our fieldwork confirms this idea. In addition to pointing out that the actors involved do not share any common vision of the effects of human-made action on the environment (hence ongoing disputes and social transactions), we also want to insist that none of them can claim to have any panoptic understanding or control, nor, on the other hand, can they be singled out for blame when it comes to zoonotic disease management.

Expertise is indeed a relational property, i.e., it has to be recognized as such by the audiences addressed. This recognition process is connected and limited to each boundary space and its specific actors; thus, it has no general scope in a territory. For instance, hunters are not necessarily considered to have the most legitimate views in matters concerning

biodiversity or to be qualified to give tick prevention advice, as a volunteer from a local area development organization suggests:

> "For regular hikers, hunters are a danger. When they talk about ticks when they are shooting lead bullets all over the forest... [...] when they claim to be protectors of biodiversity [...] that did not help the cause of biodiversity. [...] And using them as spokesmen about tick prevention, in my opinion, it's better to have health professionals do it [....] and to post tips in bakeries". (interview, 12 April 2022)

More broadly speaking, a facilitator at the *Ligue de protection des oiseaux* (the largest bird protection society in France) summed up well how difficult it is to produce a legitimate discourse; the views expressed by one group will be considered to be biased by the other parties:

> "The local actors can act as relays but [....] you can't ask local authorities to become experts in tick-related issues. We're not legitimate either. [...] We're not in the medical field. [....] We're restricted to biodiversity preservation, and if we say that we're preserving biodiversity for our well-being too, we're accused of trying to scare people". (interview, 25 May 2022)

Such a multiplication of different principles of legitimacy indicates that the relations to nature have become embedded in the social context, insofar as our contemporary societies are characterized by the presence of different, independent "spheres of justice" (as defined by Walzer (1983)), with no simple principle of equivalence or hierarchy between them. The transactions that take place are therefore necessarily spatially and temporally situated, always relational and relative, and it is this characteristic that defines the dynamic of boundary spaces.

4.1.3. "Tick Areas": Forests, Wasteland and Tall Grass as Boundary Sites of Human–Tick Encounters

By the same token, it is not easy to objectively define what ecological areas are more particularly favorable to ticks, as this also involves various perceptions and beliefs. Forests first, and then wasteland and tall grass, can especially be analyzed as boundary spaces, as hazier perceptions are attached to open spaces.

Those who work in the forest consider that it is the most favorable environment for ticks. A manager at the ONF told us: "I'm fine because I work at least two days a week in front of a computer and generally only two days a week in the forest. [....] [The most dangerous area] is really the forest!" (interview, 20 May 2022). In a similar way, a farmer and a veterinarian pointed out that cutting down trees exposed farmers to the risk of tick bites:

> "– My husband [a farmer], it happens when he is cutting down trees.
>
> – Yes, forestry work!
>
> – When he goes to get some wood. Trees that are in the parks, because he always tries to have shady areas in the parks, and trees that need to be cut and are damaged, that's when he gets ticks". (interview, 5 July 2022)

The role of vegetation was often mentioned. Dense undergrowth vegetation is often perceived to be favorable to ticks. Several members of local sports and leisure organizations thus reported: "What I see is that you're more likely to get ticks when you're in thickets, in low bushes. It happens less when you walk in the paths. [...] When you go mushrooming for example, you sometimes rub against the low bushes, so then it's simpler for ticks to settle on you" (interview, 9 May 2022); "It happens when you go through the fern, that's when you get ticks" (interview, 12 May 2022).

Tick presence was often connected to abundant undergrowth vegetation, which depends on the stands of trees and their condition, on whether they let more or less light through:

> "This is a damp area, there's a lot of ash trees and besides, it's a deer spot so you automatically get ticks! [. . .] When we look down at your pants, we find one, two or three ticks. On the big beech stands [. . .] it's quite closed, quite dark, so there's very little vegetation underneath. [. . .] There's also the issue of the oak processionary caterpillar. Last year, in July, oaks looked like it was January, they had no leaves! So this brings more light to the ground, and the vegetation exploded even more. Different things have an impact at the same time and it has an effect on ticks". (interview, 20 May 2022)

It has been shown that ticks are not only abundant in France in forest areas (Mathews-Martin et al. 2020), even though most people, including healthcare professionals (Bord et al. 2022, p. 8), tend to establish a link between them. Our survey respondents did not actually keep only to this point of view but also mentioned wasteland and tall grass as possible "tick areas". Since wasteland seems to be less subjected to human intervention, it appears to be a favorable environment for ticks. The representative of a hunters' federation referred, for instance, to military camps:

> "I hunt at the military camp: 12,000 hectares where there's nobody apart from the soldiers. It's a dry grassland and it's chock-full of ticks! I think that when I go hunting in October, I removed over thirty ticks from my dogs after a day's hunting. [. . .] And I skinned a wild boar that came from the camp [in the middle of winter], the ticks were climbing up my arms!". (interview, 8 December 2021)

The respondents commonly mentioned tall grass as presenting high tick-bite risk. As an example, a hunter told us: "I think that it happens more in the tall grass, in bushes, than on very low-cut environment" (interview, 8 December 2021).

On the other hand, the farmers surveyed rarely referred to farmland as a favorable site for ticks. Cereal growers, in particular, explained that their mechanized type of work preserved them, even more so than livestock farmers, from contact with ticks:

> "Personally, I'm most of the time in my tractor. . . That said, I think that a livestock farmer, he can get bitten when he goes round his pasture. I have a cousin who regularly goes round on foot, I think that if you walk in a pasture wearing shorts and flimsy shoes there's a risk". (interview, 6 July 2022)

A pig and cereal farmer added: "Farmers spend half of their time driving a tractor, one fourth of their time doing mechanical work and one fourth looking after their animals" (interview, 8 July 2022). Tick risk perceptions thus reflect professional changes affecting people's relationship to nature, which suggests that social factors are also relevant beyond purely ecological or medical approaches. Hence the question asked by a livestock farmer couple: "In the end, how real is the risk? [. . .] It was true in the days when people used to do work with their hands but it's no longer the case" (interview, 8 July 2022).

Those tangible accommodations show that the boundary spaces of human–animal interactions are evolving. This raises the question of how relevant scientific studies can be to different types of local environments and professional fields and to their evolution. It is essential for research to be based on a "sense of place" and to be attentive to the socio-ecosystemic conditions that cannot be understood outside of "residential knowledge" (Kohler 2012).

4.2. Health-Centered Points of View: Awareness of Lyme Disease in One's Close Environment

In addition to the socio-environmental theories we have unpacked above, there are also more health-centered approaches to tick-related issues, especially focusing on Lyme disease. The actors' approach to Lyme disease is here again shaped in their social transactions by local perceptions and by the way they consider healthcare schemes and professionals.

All the respondents mentioned Lyme borreliosis, whether they were involved in hunting, forestry, farming, natural life or leisure activities. It is what immediately comes to mind when ticks are talked about, as the following discussion between two heads of a hunters' federation shows:

> "– In the upcoming issue of the federation's journal, there's Lyme disease. [. . .] It's written by a doctor. [. . .] And during the meetings the hunters ask to be told about 'Lyme disease, Lyme disease. . .'
>
> – We all think, 'I'm going to get Lyme disease!'". (interview, 8 December 2021)

Many respondents had the same feeling. For example, a forester at a private estate confessed: "Given the consequences on the medical level, we all end up thinking, 'maybe I'm living with Lyme disease. . .'" (interview, 24 March 2022). And a sports leader concurred: "There's a real risk, that's for sure, more and more people are being diagnosed with it" (interview, 9 May 2022).

The interviewees' understanding is informed by socially shaped perceptions of the health situation: their perceptions are based both on experiences that they lived themselves or that were reported by people close to them, and they are fueled by the fears and fantasies attached to severe illnesses. The role of very local intermediaries is essential in this process. From that perspective, representations of ticks are always in the making: the references individuals draw upon are based on the current state of medical knowledge and public discourse on the disease. The words of a sports club manager are quite telling. He was bitten two decades ago, and his awareness of the disease and the way it was treated were very different from now:

> "There was a time, people didn't know much. I had a little red spot on my calf all summer. But we didn't know any better than that, that was over 20 years ago. [. . .] We had a blood test, [. . .] the result was I was positive. [. . .] A friend of mine is in the same case as me, he didn't take anything, just like me, I didn't take any [antibiotics]. At the time I was told that I was a carrier but did not have the disease". (interview, 30 May 2022)

Things are different today. When we talked to the representative of a hunters' federation about Lyme disease, he did not cite established knowledge on the subject but wondered about "chronic" forms of the disease, the source of medical controversy today (Aronowitz 1991; Dumes 2020):

> "Lyme disease is something I've been wondering about. [. . .] So much so that I invited a doctor to come hunting with us once. [. . .] And he told me, 'we know a few things but we're just learning about chronicity'. Before that, if you hadn't got Lyme disease after one year, people would say, 'well you didn't catch it!' But that's not true! Because two years later, four years later, you can get it. [. . .] Fifteen years ago, no one talked about chronic Lyme disease, but people talk about it now". (interview, 8 December 2021)

Almost every respondent said that they knew someone who had been affected by a severe form of the disease, switching from medical considerations to insights gathered from the perception of actual medical conditions, if not direct experience. The boundary space over Lyme disease is thus not theoretical (an abstract risk) but truly personalized (a real probability with visible consequences). The members of natural life and leisure organizations we met in the Argonne region provide a good example: they all had in mind a few severe cases of the disease, as confirmed by the leader of a hiking group: "People know of cases of Lyme disease that have been delicate, someone who was in intensive care at the hospital for two or three weeks" (interview, 27 May 2022). Similarly, the leader of a trail club mentioned acquaintances who had suffered from severe effects of the disease: "Among the people in my circle, I know a few who got Lyme disease, they're OK now but they had a [difficult] time. . ." (interview, 12 May 2022).

Social perceptions of Lyme borreliosis are also reflected in the respondents' relations to healthcare professionals and the protocols they implement. Another boundary space emerges, challenging the strictly medical gaze. The healthcare professionals that people are first in contact with are rarely provided with panoptic knowledge on the issue and might benefit from better continuous training programs. A study conducted in France in the Auvergne–Rhône–Alpes region showed that while pharmacists had solid knowledge about

preventive measures for tick bites and Lyme disease—i.e., health-related issues—their knowledge was less developed in the field of tick biology, i.e., they were less familiar with a socio-environmental approach to ticks, a localized understanding of tick hosts and of the conditions encouraging tick activity (Bord et al. 2022).

During our survey in the Argonne region, this more particularly applied to doctors consulted after a tick bite to make a diagnosis. The respondents sometimes expressed some distrust regarding local practitioners. An employee in an environmental organization stated: "I think Lyme disease is still so little known today, whether by laboratories or doctors, well the doctors are beginning to get trained, but not everywhere" (interview, 3 May 2022). A veterinarian we met remained very cautious about the information she was provided with: "We're all a bit in the dark and like everybody else, we hear everything that's being said everywhere" (interview, 5 July 2022). A hunter, expressing similar types of concerns, explained that he had broached the subject with his general practitioner, following a bad experience in his family:

> "One of my cousins, with whom I started hunting, [. . .] over ten years ago, he got Lyme disease. But at the time, it wasn't documented, at least not by GPs. He got bitten on his thigh and the erythema appeared: the doctor did not do anything about it and [. . .] he really started having health issues. [. . .] Today he still has very significant joint pains. [. . .] The other day I changed GPs. [. . .] Spontaneously I told him, 'if I ever have symptoms that make you think it could be Lyme, don't hesitate': I kind of took the initiative". (interview, 22 March 2022)

As can be seen, in this social–health nexus, grassroots perceptions are independent from theoretical knowledge and, rather, based on experiences that have been lived in the family or by relatives, which function as a boundary space. This was the case in the various groups surveyed. The head of a hunters' federation told us: "My uncle got Lyme disease, he was really, really ill for one year, he couldn't walk more than 500 m. He must have got it while hunting, I suppose. [. . .] So when I come back home, I check myself! Just to be sure" (interview, 8 December 2021). The foresters held the same type of discourse; for example, a forestry trainer at a private estate said he knew someone who had been infected by the disease: "I have a friend who has really been suffering for years from the effects of Lyme disease. She's been identified now, but she's suffering from the treatment. We're obviously affected by this and we always have this in mind" (interview, 24 March 2022). In the local sports and leisure groups, which organize outdoor activities, similar things were reported: "In the group, there've been people with Lyme disease. [. . .] One of them has even been hospitalized", the leader of a hiking club told us (interview, 27 May 2022).

Conversely, people are less sensitive to the issue and less careful when they have not been made aware of the situation of relatives or friends: they then do not feel personally at risk. For example, a hunter declared: "It only happened to me twice, so you know. . . [. . .] I'm not too concerned so I don't attach much importance to it. [. . .] I don't find them [ticks] and I don't even pay attention to them" (interview, 17 February 2022).

That is not all: our survey showed that people had a much clearer awareness of tick-borne disease when their dogs or cats had been bitten by ticks. Here, pets act as a central intermediary in the boundary space between men and ticks, as they embody the porous nature of these spaces, for instance following the hunter on his hunt as well as to his home. We know that domestic carnivores can play a real role in the distribution of ticks in certain areas (Panayotova-Pencheva et al. 2021). But it is, above all, the perceptive effect that stands out here. The animals act as relays, conveying to them the concrete reality of tick risks—which have been demonstrated in the literature, for instance in a study focusing on military working dogs in Austria (Sonnberger et al. 2022). A farmer from the Marne region, also a hunter, thus explained that hunting dogs are often the first concrete indicators of tick presence: "You often see [ticks] on the dogs first. It's the dogs that pick them up the most!" (interview, 7 July 2022).

In addition to the role of relatives suffering from Lyme disease, a second channel for the awareness raising of tick risk is specifically provided by pet animals as border hosts,

especially when they are affected by piroplasmosis. The disease is not perceived as only affecting dogs or cats; what the animal owners understand, above all, is that tick bites can transmit disease. Given the proximity between their hunting grounds and their everyday environment, the threat for human beings also materializes in more concrete ways. The head of a hunters' federation expressed his fears in the following way:

> "I used to have a labrador retriever, she got piroplasmosis when she was eight or ten months old, I almost lost her. She stopped eating, she was out of shape and [the vet] gave her an injection that saved her. [….] I think it worries me even more when it affects my dog. But for myself as well of course!". (interview, 8 December 2021)

Moreover, pets can bring ticks into the home (Alvarez-Hernandez et al. 2022), which makes awareness of tick risk even stronger. A forester thus told us:

> "My dog brings them home, [. . .] I see it rubbing its snout on the couch and often it's a tick. [. . .] I once found a tick on the living room table, ready to jump out again, waiting for its prey, [. . .] on the corner of the table. Anything's possible. Sometimes I see some running across the floor too". (interview, 20 May 2022)

On the other hand, in the farming world, tick risk is perceived to be limited. This is the case when intensive animal farming is being practiced. For example, a farmer stated that he had never found any ticks on his pigs, which are confined to a closed environment (interview, 8 July 2022). But the same perception is also widespread on smaller farms or where so-called "reasoned" agriculture is practiced. For instance, a farmer who raised cows daily until about ten years ago does not remember ever finding any ticks on cattle, whereas he did on his cats: "We never had ticks on the cows. I think it's mainly cats and dogs, they very regularly bring them home" (interview, 6 July 2022). Furthermore, tick-borne disease does not feature on the agenda in the farming sector, given that it does not have any significant impact on its activity. This is confirmed by a cereal grower who used to be a dairy farmer: "I've never heard of anything [concerning tick-related issues], I have no memory of it. [. . .] I don't think the trade unions or the farming profession have put their finger on the tick issue" (interview, 6 July 2022). Since there does not seem to be much economic or health impact when livestock is affected, little attention is paid to it, as confessed by a farmer: "Honestly, we've already seen [ticks] on our animals, but [. . .] we've never worried about it" (interview, 5 July 2022).

A clear distinction can thus be observed between the perceptions attached to pets (dogs, cats, horses, etc.) and cattle. While the former appear as border hosts and raise concern, the latter, lost in the anonymity of the herd, are not the object of individualized, particular attention. A farmer drew an explicit distinction between horses and cows, both in terms of perceptions and practices. This reveals a specific transaction about the farmer's subjective relation to animals, depending on whether he considers them collectively or as individuals:

> "In the middle of a herd, you're going to have some good cows and sometimes I'll find one [a tick] and I won't have the tick remover with me. Because when my horse gets some, I go back home to get the tick remover. But for cows, never. [. . .] If it's a big one, I'll just pull it out. I know it's not the best thing to do. But most of the time, we just walk past the cows and we don't even see them". (interview, 5 July 2022)

In the end, individuals' relations to ticks are more or less determined by their perceptions of immediate tick-bite risk in their environment, by the fact that relatives or friends have previously been diagnosed with a tick-borne disease or the feeling that Lyme disease is prevalent in their community. In addition to drawing attention to these three factors—with a sometimes cumulative impact—which have also been identified in studies conducted in the United States (Beck et al. 2022), our research points to two important processes through which these perceptions are shaped: the feeling that the risks of exposure to ticks and to

Lyme disease have been increasing recently and the strong role played by pets and hunting animals in making their owners aware of the possible consequences of tick bites.

The localized perceptions of tick risk in the Argonne region thus reveal a double process of translation: from an ecological approach to a socio-environmental understanding of the issue and from a medical approach to more localized socio-health perceptions. These processes of socio-territorial incorporation involve a series of social transactions across different scales of understanding and action between the global and the local, nature and society and between the different groups involved, who can have common or differing perceptions and practices.

4.3. Social and Local Tick-Bite Prevention Behavior within Environmental, Health and Personal Responsibility Approaches

Tick-bite prevention behavior is the result of a threefold approach to tick-related issues, i.e., shaped by environmental and health concerns as well as by calls made on individuals to take personal responsibility. Emphasis on personal conduct rather than on collective regulations seems to prevail. Significantly, the leaders of leisure organizations all appeared to be guided by the same ideas, i.e., that the degree of tick risk should be assessed by each individual on his own rather than by those organizing the outdoor activities. According to them, there is no need to issue specific instructions or to establish collective "best practices":

> "Everyone knows about tick issues. [. . .] But it's up to each individual to manage. [. . .] They do it on their own, [. . .] our members who have dogs are used to all this stuff. [. . .] We don't do any particular prevention on the subject" (interview, 30 May 2022).

A forester at the ONF also claimed that individuals had to adapt to the forest environment and assess the risk on their own:

> "We clearly don't adapt the biotope to the user in terms of tick risk. For now we're only doing the minimum, that is give people information that there are ticks, that they can cause difficult illnesses and that it's up to them to adapt. This means that ticks are part of the natural environment: either the people [. . .] know they are taking risks and they do it in full awareness of the danger, or they can wear boots and stuff to go into the forest". (interview, 20 May 2022)

Instead of reorganization of or restrictions on the collective use of natural spaces—for instance, defining specific times and places for hunting or hiking—personal responsibility appears to be emphasized. This trend can be observed in the way the respondents referred to specific boundary objects (used in exposure situations) and in the calls made on them to conduct ex-post body checks.

4.3.1. Clothing as a Boundary Object

Body-covering clothing can be considered a visible protection against ticks. It can be analyzed as a boundary object in three different ways: materially speaking, it is a boundary object between individuals and their environment; it is also an object of ever-ongoing transactions, throughout the year, about the specific clothes individuals are supposed to or accept to wear; and finally, when it comes to the reasons given by the respondents for choosing specific clothing, the desire to protect themselves against ticks should not be overestimated.

In the professional context, the foresters especially insisted on the role played by adequate clothing. A technician, for instance, praised the protective clothing provided by the ONF:

> "I have a water-repellent softshell outfit, I have a red and black jacket, it's the new gear for ONF foresters in the Ardennes. [. . .] It's tight at the wrist, I wear gloves over it, [. . .] I've got into this habit. [. . .] In that respect, softshell jackets work

> well: when I wear it and I close it, usually on the upper part of my body, I don't get ticks. You'll see them running all over the jacket". (interview, 20 May 2022)

Having incorporated the need to pay proper attention to his clothing, a private forester explained he did so not only in his professional activity but also took care at home and usually changed his clothes every day:

> "Very often when you come back from the forest, you've had no tick bite on that day: you wake up the next morning, two days later and in the shower you feel, 'there's something. I've been bitten!' Actually, I realized we all made the same mistake in the forest: [. . .] after the day's work, we change our shirts, no problem; but we take off our pants and put them back on the next day. [. . .] If you really change the whole outfit every day, I think you won't be bitten. [. . .] If you put some clothes back on the next day, you can imagine that the thing [. . .] spends the night in your pants and the next day [. . .] it bites right into you!". (interview, 24 March 2022)

For a technician at a hunters' federation, this is also a self-evident matter: "If I go into the wood wearing pants with shorts and boots, I'll be less likely to be bitten than my neighbor who [. . .] goes wearing only shorts" (interview, 9 December 2021). Celebrating personal responsibility, hunting federations insist on the exemplary habits adopted by hunters. Their awareness of tick-bite risk is demonstrated by the clothing they wear in the forest, in contrast to occasional strollers:

> "We work in the forest in July-August-September: I never see any hunter wearing shorts! They all wear pants, shoes, gaiters and all that. When you go for a walk in the forest in September, you'll see a lot of people wearing shorts. That alone shows that hunters are [. . .] becoming more and more aware of tick issues". (interview, 8 December 2021)

Outdoor leisure organizations also unanimously declared that their members wore body-covering clothes, even suggesting that this was a matter of pure common sense: "People know they have to wear pants. They make light summer hiking pants now, I for one don't go hiking wearing shorts anymore. Very few people go on a hike in shorts" (interview, 30 May 2022).

These responses show that regular users of forest and natural spaces often wear body-covering clothing to protect themselves against tick bites, as our on-site observations have also confirmed. However, these general statements need to be qualified and further explored in relation to various concrete situations.

For all the respondents, clothing precautions involve transactions which both reflect the fact that health-related considerations are embedded in a social context and that health-centered and socio-environmental understandings of the issue are also combined with a belief in personal responsibility, resulting in individualized practices.

In the hunter group, personal adaptations mostly depend on the season, as even individual summer hunting can cause a higher exposure to ticks than collective winter hunts:

> "It's really less covering in summer, otherwise it's stifling hot! In general, just a T-shirt and canvas pants. Frankly, if I'm going to sweat and not even be able to see through my glasses. . . [. . .], twice, it's true, I've been bitten by ticks in the summer, and those were the only two times in my life". (interview, 22 March 2022)

Hunters are not the only ones to have a flexible approach to clothing recommendations. A territorial unit manager at the ONF confessed: "Honestly, I can't tell you that when it's 38 degrees outside, we're in the forest and we're dressed like I am today [on a cool and rainy day]. After a while we end up in a T-shirt, even walking through fern, it's not good but that's the way it is" (interview, 20 May 2022). Farmers also only partly take care, like a livestock farmer we interviewed in July, who explained she paid particular attention to the lower part of her body: "I have bare arms when it's hot like this, but I always wear pants and closed shoes, that I do" (interview, 6 July 2022). Similarly, the leader of a hiking

club insisted that they tried to make their members aware of the need to wear protective clothing while confessing that it actually all depended on the temperature:

> "We also recommend wearing long pants. I always put gaiters on, it's a protection, I almost never have ticks when I'm dressed like that. But then, from time to time, I wear shorts because gaiters, they're too hot. During the Pentecost weekend, [. . .] the weather was good, so we leave our legs bare". (interview, 27 May 2022)

The use of bug repellents is another subject for transactions. These kinds of sprays are used by hikers, as we observed when we took part in the *Grande Traversée de l'Argonne* in late May 2022. A veterinarian also said she used them: "I use spray in the forest, more and more. . . A spray I buy in a pharmacy, a real anti-tick spray. [. . .] I feel like I get fewer ticks" (interview, 5 July 2022). For some, this is an extra protection against tick bites, which they use in addition to body-covering clothing, while others believe this can dispense with them taking clothing precautions. The above-mentioned veterinarian added: "I still often go into the forest wearing shorts" (interview, 5 July 2022).

In some professional contexts, protective measures are also more or less adopted depending on the perceived benefit–risk balance. These decisions spring from institutional transactions, combined with a process of translation from a medical approach to socio-professional considerations. An occupational health and safety officer at the ONF mentioned the use of bug repellents over clothes as a telling example: "The only preventive measure, today, on which everyone agrees, is to cover your legs as much as possible. You can also use a repellent, but even then! Not in a professional context because it would not be good to use every day" (interview, 15 June 2022).

Through a double transaction, tick-related health issues have been resituated at the interface between principles and rules that neither spontaneously nor fully overlap. The resulting compromise is integrated into an institutional frame because it produces legal effects. We define second-order transactions as occurring within this institutional context in which the relations between actors in the field have already been initially defined, providing the legitimate principle of action and first-order transactions. These do not preclude other compromises on more localized principles. Second-order transactions open up some leeway in the institutional order, which is not only based on rigid, established regulations but is also shaped by ever-evolving processes of appropriation and standardization.

A first-order institutional transaction here resulted in recommendations by the ANSES (the French Agency for Food, Environmental and Occupational Health & Safety) about which products should be used, based on their composition. Then, a concrete second-order transaction was worked out at the level of the ONF health and safety department about the information to be given to its officers and workers. In the end, the decision consisted in suggesting the use of a repellent, but without as much urgency as the use of body-covering clothing and with the added provision that the repellents should not be used directly on the skin. As can be seen, "best practices" are nothing but the temporary result of a compromise involving current medical knowledge and controversies, healthcare professionals' opinions and socio-professional conditions:

> "Our approach, in the health prevention department, is we always go see the occupational physician, who is going to give us recommendations. Often, when the studies are not based on sampling, the physician [. . .] will say, 'your employees are exposed to chemicals on a daily basis and the benefit-risk cost may not be in their favor'. [. . .] We have some repellent molecules, for instance we use product X because it has a molecule [. . .] that is authorized by ANSES. We advise our employees to use that type of repellent on their clothes, to avoid direct contact with the skin, and not on a daily basis. [. . .] So we don't force people to use it, we just make it available". (interview, 15 June 2022)

Finally, there are reasons for choosing body-covering clothing other than the desire to protect oneself against ticks. Such decisions must be understood in a broader context. A forester thus explained:

> "It doesn't require any particular effort. You realize that if you're well protected against ticks, it's easier to do your job without getting hurt or getting scratches. You don't need special anti-tick equipment, it's just common sense so as to feel good in the forest". (interview, 24 March 2022)

Similar views were expressed among the hunters, who, during hunting, need to not only protect themselves but also to find ways not to be spotted by wild animals: "There's also a practical reason. Because game can see color contrasts. [. . .] So the guys who hunt in summer put on gloves and hoodies. Against mosquitoes also by the way [. . .] and against processionary caterpillars" (interview, 8 December 2021). Tick-bite risks are thus considered to be only part of a wider range of issues that deserve attention. Likewise, organizers of outdoor and sports activities in the Argonne region reported that their clothing choices were not only meant to protect themselves against ticks but also, if not more, against mosquitoes:

> "We pay more attention to mosquitoes than to ticks. They're more annoying, well they're less dangerous, but. . . Around the ponds, [. . .] there were little flowers that could be picked from around the trees, wow! When I saw the mosquitoes flying around. . . I wondered how the people who had come there for the weekend would be able to stay". (interview, 12 May 2022)

4.3.2. Personal Responsibility in Practice: Body Checks

Even more clearly, the emphasis on personal responsibility is reflected in calls for carrying out body checks after work or after outdoor activities in all the groups surveyed. This can be considered another type of adaptation, meant to ensure that people can carry on with their hunting, professional or leisure practices while still taking tick risk into account—although proper attention to tick risk is then deferred to the time after exposure. Among others, a hunter described the body checks he was now used to carrying out as an end-of-day routine:

> "When we sleep at the hunting lodge, last summer we went on individual hunts but, in the evening, [. . .] we would go for a stroll. [. . .] I would raise my arms, strip down to my shorts, 'can you see some on my back or not?' [. . .] It was a bit of a ritual we had". (interview, 22 March 2022)

In the forester group, a technician at the ONF likewise explained that he had got into the habit of checking his own body for ticks, or asking another person to do it for him:

> "I've got into the habit of automatically checking myself. [. . .] At the end of the day, I usually take a shower, so that's when I check myself. The other day I had doubts about my back, [. . .] I had to go up to my parents' house and ask them to check. [. . .] But otherwise most of my colleagues have a partner so their wives have a look". (interview, 20 May 2022)

At the same time, attention paid to body checks can also result from second-order transactions about which practices should be adopted in the face of tick risk; they might be used to compensate for a lack of precaution during outdoor activities, or because the need for extra caution is felt. This was suggested by a sports club leader, a farmer as well as a rural veterinarian:

> "I don't use anything, no cream, no spray. . . Then I need to be careful when I come back home, look behind my knees, if I've got some attached, they'll be there. The elastic band of my underwear, they get stuck in the elastic band, in the lower belly part. [. . .] When you come back from the forest, you can't go three hours without getting a shower!". (interview, 12 May 2022)

> "Sometimes you get some [ticks] in parks but you don't notice. Often you notice only when you're home. It's itchy and sometimes you even got bitten in the morning and realize it in the evening". (interview, 5 July 2022)

> "When I go into the forest, it's true, I don't necessarily use special equipment. But when I come home, it's time for full-body inspection!". (interview, 5 July 2022)

Attention to tick-bite risk should not, then, be considered a blanket phenomenon; it can be expressed in various concrete ways, depending on individuals' perceptions. Like clothing, tick removers can also function as boundary objects. An increase in the use of tick removers indicates effective evolutions in tick-risk preventive behavior. The manager of an outdoor activity organization now sells some in the sports store he runs:

> "I've pulled a lot out by hand, but it's not great. With a tick remover it's easy. [. . .] And I've just had another offer. Clips, for hikers, like carabiners. [. . .] I place them on the counter, I bought 20 last year, I've almost run out". (interview, 12 May 2022)

A technician working at a hunter's federation also clearly recommended using a tick remover: "Now that's something you have to deal with [ticks]. [. . .] First you need a tool, if you have to pull them out. So I said, half-jokingly, we're going to make some tick removers with *Fédération des Chasseurs* written on them for communication purposes!" (interview, 9 December 2021).

However, although some people might have heard about tick removers, or even bought one, this does not necessarily mean that they use it. We talked to a hiker who took part in the 2022 *Grande Traversée de l'Argonne*: "Some have tick removers, I didn't have one. But we have some at home" (interview, 30 May 2022). A farmer also confessed: "I think you need to be careful when you pull the tick out: you can remove the tick and leave the most dangerous part in. [. . .] But I've never used [a tick remover], I used tweezers" (interview, 17 August 2022). There are, then, ever-evolving transactions defining individuals' relation to tick removers, and the need they feel to take one with them or not. These can also be based on time considerations: "We use them [tick removers], I always have one. If we only go for a day or half-day [hike], I don't take them, but when we leave for the weekend, for two or three days, we do" (interview, 27 May 2022). In that respect, tick removers function as boundary objects in the general discourse about personal responsibility.

4.3.3. The Political Dimension of an Environmental and Public Health Issue: Prudent Risk Communication

The management of tick-related risks raises issues of social "control", both in terms of the governance of socio-ecological change (Hamman 2020) and of medical discourse (given the ongoing controversies around "chronic" Lyme disease). Public discourse tends to dismiss what might sound too alarming. An occupational health and safety officer at the ONF explained that he tried to be reassuring when talking about Lyme borreliosis: "What we tell people is that many people have caught Lyme disease and that, like a lot of bacteria that gravitate around our bodies, our bodies have an immune system that enables them to react and protect themselves against it" (interview, 15 June 2022).

This discourse is all the more significant as it develops across the three different types of approaches to tick-related issues we previously distinguished as boundary spaces:

- The socio-environmental approach: the goal is not to erode the positive values attached to natural spaces;
- The health-centered approach: the goal is to avoid raising more doubts about medical and scientific discourse, especially about the diagnosis and treatment of Lyme borreliosis: "It is by objectifying things that we'll make progress, not by distorting them and making them sound alarming. And after all we know nothing about this, nothing!", adds a private forestry trainer (interview, 24 March 2022);
- The emphasis on personal responsibility: in prevention messages, the calls on individuals to adapt their health behavior are also a way to avoid deepening possible localized conflicts between professional and social groups on the subject, as well as to avoid impacting local area development policies.

Even though some studies have demonstrated a causal link between the prevalence of Lyme disease and forest exploitation in Europe (Wierzbicka et al. 2016), both foresters and the leaders of local community groups in the Argonne region have avoided taking positions on tick-borne disease that might invert the meanings associated with the forest:

> "We know the danger, we also know what we've got to do to limit it. [. . .] The tragedy would be if in the end, people thought, 'we're all gonna die' and we must not go into the forest anymore 'cause it's a hostile environment. [. . ..] When I'm in the forest, I feel good, it's peaceful, it's relaxing". (interview, 3 March 2022)

> "We came to take a breather, to make contact. 'Be careful, there are ticks and you're gonna catch Lyme disease and it paralyzes you, the nervous system is affected'. . . [. . .] There's no need, if we go there one afternoon, to cause everyone to panic". (interview, 27 May 2022)

An occupational health and safety officer at the ONF underlined that it was not easy to give advice on tick risk within the professional environment. If the measures taken against the consequences of tick bites appeared to be too limited, this could foster fear rather than alleviate it:

> "When you talk too much about a threat and don't know how to deal with it, it makes people feel afraid! [. . .] We prefer to talk about risks for which we can provide solutions. And unfortunately, tick risks, we're a little short on suggestions, and especially when you know the consequences tick bites can have [. . .] it's complicated to deal with". (interview, 15 June 2022)

In the Argonne region, the messages aimed at the mainstream public are intended not to scare away nature lovers, children or tourists. We know that "the presence of ticks and the associated risk of tick-borne diseases significantly influence the choice of recreational area and have substantial welfare effects", as more broadly shown, for instance, by a survey-based choice experiment among respondents residing in areas with different prevalences of ticks and tick-borne diseases in Sweden (Slunge et al. 2019, p. 1). The leaders of natural life, sports and outdoor leisure clubs all used this argument, which shows once again that the localized perceptions of tick risk have a social, rather than a purely ecological or medical, basis:

> "I'm always wary of too much prevention, because it scares people away and what we want is to attract people to our region. We don't want to tell them there's a danger, we're not in the wilderness. [. . .] Our priority when we give information is to attract people. This is already a society in which everyone is afraid of everything". (interview, 9 May 2022)

In the end, the rejection of alarming or even "infantilizing" (interview of the member of an environmental organization, 3 May 2022) messages confirms that risk communication about Lyme disease (Quine et al. 2011, pp. 2016–17) is first and foremost based on calls for personal responsibility taking, as suggested by a forester:

> "We need to keep this in the hands of medical professionals but we also need to focus on prevention and education measures. People need to understand that they can't constantly be on edge because there are all kinds of parasites they have to learn to live with, that's just the way it is. [. . .] People are not stupid, we can explain this to them". (interview, 24 March 2022)

While public health or occupational health policies need to be careful not to foster overdramatic common risk perceptions that might make them less effective or even counter-productive, especially if forests become widely associated with danger, nonetheless, rather than encouraging the implementation of finely tuned localized preventive measures—as some scholars have been urging (see Dernat and Johany 2019b, based on a survey led in the Massif central in France)—they have instead tended to shift attention to the individual sphere.

What this brings into view, in fact, is the multiplicity of possible relations to the forest and to nature. Significantly, an officer at the ONF mentioned that he had been suspected of not caring properly for the site around a pond—not cutting the grass often enough—because ticks were present there (Figure 5). Two different considerations come into play: in this case, forest management on the one hand, and local area and tourism development on the other. Transactions at two different levels can be observed. A first-order transaction resulted from the negotiation between the Community of communes (Comcom) and the ONF as to the areas that needed to be managed and the methods and objectives pursued:

> "The Comcom is in charge of the upkeep of all the paths, the footpaths and mountain bike trails too. We only maintain the edges of the forest roads. [. . .] This means mowing the road verges, the grass and then down to the ditch and back ditch, to prevent the hazel trees from encroaching on the verges". (interview, 20 May 2022)

(**a**) (**b**)

Figure 5. Field observation: at the picnic area of the Héronnière pond (**a**), vegetation is taking over from the facilities (**b**), emboldened by a wet start to spring. On site, a sign warns of the tick risk, but maintenance work does not seem to be carried out regularly. (Photographs by Aude Dziebowski, UMR SAGE, 20 May 2022).

This agreement then led to a second-order transaction, similarly concerning the upkeep of the site. The choice of mowing the grass twice a year is a practical compromise, based on the parties' differing interests. The Comcom is taking charge, rather than the ONF, to ensure that the site remains attractive:

> "Depending on the period, on the day, there can be anywhere between 10 or 15 to hundreds of visitors. There are all kinds of activities: mountain bike tracks, trail running, there's a tree climbing park on the outskirts, and a campsite just nearby. [. . .] Then there's the pond where lots of people like to go for picnics. [. . .] At the ponds, [. . .] I've been attacked on this point: "you're letting the grass grow too tall, we get ticks". Except we can't afford to come and mow the grass every week. Now the Comcom only mows the grass twice during the season, because we just don't have the time anymore, so the Comcom has agreed to do it for tourism. But what between nettles, processionary caterpillars and ticks. . .". (interview, 20 May 2022)

Marc Mormont (1992) underlined that transactions are detached from the law in the process of elaborating compromises while remaining integrated within the realm of the law, since they produce legal effects. The existing rules define limits as to what can be done; for example, limits on the areas of responsibility of local authorities or State departments. Yet, since they only define broad outlines, they leave significant room for the elaboration of

localized and partial secondary-order transactions. A manager at the ONF sums this up in this way:

> "Against ticks, there are no specific mowing instructions. We used to mow. Now we're in a period of change, [. . .] with less money for forest management. [. . .] Obviously where there are tables and benches, every summer from the month of June it's visible if the grass has not been cut, whereas you can go cut wood in the forest for 60 years without anyone noticing anything. But if after 70–80 years the forest is not replaced, there's going to be a problem. So with funds being limited, the choice we've made has been to maintain the forest and not the tables and benches for tourists. The mowing has been delegated to the Comcom, just so that the tables and benches would not be covered in 150-m-high brambles". (interview, 20 May 2022)

This second-order transaction simultaneously occurs at three levels:

- at the organizational level: between a local government body and the ONF, concerning the type of maintenance to be carried out, given the financial means available;
- at the territorial level: based on principles covering different (more or less extended or restricted) areas of action (a state-owned forest, the ponds within the forest etc.);
- at the level of time: on the one hand, the priorities made are tied to different meanings and perceptions attached to time—whether the short term or the longer term is being favored and also depending on the forest users considered; on the other hand, the process of reaching a transactional agreement has been facilitated with the adoption of a middle-ground approach—mowing twice a year—which does not directly interfere with the uses of the different stakeholders, i.e., with the first-order agreements.

More generally speaking, the large number of requests for clearing and maintenance that the ONF has to meet is a reflection of all the different possible uses of forest spaces—by hikers, mountain bikers, schools, horse riders, etc.:

> "There are foot races, so they don't just use the forest roads but also the main paths. There's also a long-distance hiking trail. [. . .] This year, there's also someone who's going to be doing some storytelling in the forest and he's already asked if we could clear a bit the areas where he's going to take [the people], especially if there's tall vegetation, because of ticks. Then there are foot races, mountain bike races, schoolchildren also are coming, middle and high school kids. [. . .] We also used to have requests from horse riders. . .". (interview, 20 May 2022)

As becomes clear, the tick issue needs, then, to be explored from multiple angles and at different levels: its local translations are carried out by different groups, with partly, but never entirely overlapping, perceptions and practices, establishing different types of relationships and compromises together. Differing uses of the forest space account for differing expectations and differing views as to what the right action should be. A territorial technician at the ONF thus described the criticism he will meet with:

> "We're going to be attacked about our cutting, we're going to be attacked because the conifers and ash trees are dying, because there are processionary caterpillars and because we're not doing anything! [. . .] Last time, a colleague was at the bakery, he was verbally attacked". (interview, 20 May 2022)

When diverging interests and values come into play in the same space, there are limited resources for viewing the situation objectively, including expert reports; the reports may have been commissioned and, therefore, be perceived as biased. During an interview, a manager at the ONF referred to a study about the role played by wild boar in the forest ecosystem. He was far from convinced by the study, which came to conclusions at odds with his own on-site observations, and believed it to have been influenced by hunters' interests:

> "We can do studies too! I'm thinking of a particular study I saw on wild boar. When there's an overpopulation of wild boar, they're going to eat all the acorns falling from oak trees, so they're going to jeopardize reproduction while we want

> our adult oaks to reproduce naturally. [. . .] This study's been conducted more for the benefit of hunters, it says the wild boar are good for the forest, because there's a lot of mud around them and, in this mud, there will be different grass seeds [. . .], so when they move, they're going to brush up against other trees and [. . .] a different type of vegetation will grow. [. . .] No, no!". (interview, 20 May 2022)

The tick issue thus appears to be doubly complex, either because it makes different sense to different people, or because it is becoming confused and obscured in wider systems of action. Awareness of this is necessary in order to design and spread tailor-made messages in a specific local area.

5. Conclusions

This case study of human–tick interactions in the Argonne region can contribute to a better understanding of the complex relations between nature and society. The examination of tick-borne disease, as an example of zoonotic disease, can help reconsider previous research on risk perceptions, which is especially useful from an environmental health perspective.

In this socio-territorial and relational approach, the notion of boundary spaces coupled with that of social transactions (Table 2) proved particularly helpful for two reasons. First, it helped consider together public action (public health or forest management policies in the face of climate change) and ordinary everyday practices (for various groups of actors), including tick-bite preventive behavior. Second, we were able to study what occurred in those specific moments—specific moments that are still able to yield broader understanding—when the fields of established public policies and everyday practices intersect around issues that are socially constructed (for instance, Lyme disease) but have not yet reached a fixed definition (the treatment of the disease and whether there are "chronic" forms of it are still the subjects of ongoing debate). In this respect, the focus on ticks as a boundary object also helped in exploring similarities and differences between social groups with distinct relations to and uses of nature. For instance, changes in farming particularly stood out, resulting in less direct contact with the natural environment and less awareness of tick risk in the farming profession than among hunters, foresters or outdoor leisure organizations, for whom tick bites are indeed a major concern.

Table 2. Summary of the most relevant results of the study.

Socio-Territorial and Relational Approach	Knowledge	Perceptions	Practices
Boundary actors, objects and spaces	Local knowledge derived from direct observation rather than adhesion to expert knowledge.	Localized perceptions of "tick areas", defined as such due to their wild-animal population (deer and wild boar in particular) and flora (tick activity is believed to be more intense in deciduous forests or fern and tall grass environments).	Increasing use of tick removers after exposure.
	Intertwined perspectives and forms of knowledge: tick-related issues are not only considered by themselves but in relation to other socio-ecological forestry issues (processionary caterpillars, bark beetles etc.).	Localized perceptions of Lyme disease inspired from one's own or close relatives' experience and from one's pets (rather than confidence in medical expertise); on the contrary, appropriation of the debates over "chronic" Lyme disease.	Body-covering clothing worn as a protection (water-repellent jackets, gaiters, gloves etc.).

Table 2. *Cont.*

Socio-Territorial and Relational Approach	Knowledge	Perceptions	Practices
Social transactions	The validity of actors' practical knowledge is continually redefined, as they are aware of their limited knowledge but also convinced of the primacy of direct experience.	Emphasis on the role of climate change in tick expansion rather than on localized explanations involving human action, since this would result in different groups opposing one another.	Mitigating the effects of tick bites rather than avoiding them. Emphasis on personal responsibility rather than collective regulations.
	Practical knowledge linked to familiarity with certain areas, leading to greater awareness or forgetfulness about the threat of tick exposure.	Avoiding inverting the positive values associated with natural and forest spaces or upsetting professional habits (for foresters): ever-ongoing transactions about how to communicate information about tick risks without sounding alarming.	Preventive behavior practices vary along a gradient of increasing awareness to tick risk: first, ex-post body checks; then, to a lesser extent, use of body-covering clothing; finally, to a still lesser extent, avoidance of "tick areas". Cumulative or alternative use of these preventive measures.
	Knowledge influenced by memories of place and their evolution over time.		Flexible embrace of preventive measures: the use of body-covering clothing will depend on the season; a tick-remover will be considered more or less useful depending on the time spent in a natural area.
	Tensions between scientific and situated knowledge; for example, about how to diagnose Lyme disease or the use of alternatives to tick removers.		

Studies have suggested that the effectiveness of health prevention policies in rural areas depends on the combination of four factors, i.e., knowledge of the spatial and temporal variation of tick abundance, what constitutes risky behavior, how countryside users respond to information of varying content, and an understanding of the social practices related to countryside use (Quine et al. 2011). Our concrete case study has helped us further identify the types of factors involved (Table 2). This reasoning precisely ensures the broader transferability value to rural areas. First, the variables at play relate to knowledge: whether knowledge is available or not (scientific or medical knowledge, knowledge on the correlation between the factors likely to cause tick range expansion, etc.), whether it has been disseminated or not (our respondents derived their knowledge from local direct perception mainly) and whether it is contested (by scientists, experts, patients, hunters, hikers, foresters or farmers etc.). Tick-risk perception and management therefore appear to be complex matters, with tick risk being often understood more as the result of individual behavior than as a societal threat. Yet, it is one such threat, as witnessed by the socio-spatial configurations favorable to tick expansion and the spread of Lyme disease. One might think, for instance, of the search for local attractiveness, as exemplified in efforts made not to scare away hikers or nature lovers and to avoid undermining people's positive perceptions of the forest. All of this can account for the differential level of knowledge or awareness of tick-bite risk that has regularly been mentioned in the literature (Butler et al. 2016).

Two social processes seem to be developing in opposite ways. On the one hand, the public health issue has been depoliticized, as can be seen in the calls made on individuals to take responsibility and to adopt "best practices". This process works against movements that have been developing to bring awareness on heretofore ignored "chronic" forms of Lyme disease and to call for public action on the subject—with emphasis being placed either

on the role of "whistleblowers" seeking to publicize unacceptable human situations or, conversely, of "merchants of doubt" working in favor of preserving the status quo (Oreskes and Conway 2010). On the other hand, local socio-environmental issues have increasingly been invested with political meaning, whether concerning the relations between economic actors, spaces, professional groups or users. Differing uses of nature and natural resources give rise to a situation of conflictual coexistence. Knowledge, therefore, cannot produce any effect of its own: it is dependent on individuals' social acceptance, which is itself based on their perceptions and practices in the different social spaces surveyed. For instance, the notion of "tick areas" can be given a plurality of concrete meanings rather than provide a general concept for a better understanding of the exposure to tick risk. In this sense, by examining the three levels of knowledge, representations and practices, this study calls for a rethinking of tick-related issues through the consideration of localized concerns, health imperatives and the calls generally made on individuals to take personal responsibility. This threefold approach can help point to the challenges and adaptations paving the way for socio-ecological change in the Anthropocene. To move in this direction, transdisciplinary research resorting to social science approaches alongside health and natural science approaches needs to be not only called for but actively carried out (Talbot et al. 2021).

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Notes

1 For more information, see for instance the journal *Ticks and Tick-borne Diseases*: https://www.sciencedirect.com/journal/ticks-and-tick-borne-diseases (accessed on 20 October 2023).

2 Some authors and medical sources speak of tick stings, while others prefer to refer to tick bites. While the tick's rostrum (the part embedded in the skin) is indeed its mouth apparatus (so that it would be justified to say that the tick bites), it functions like a stinger, piercing the host's epidermis before drawing blood (the tick, then, can be said to sting).

[3] See https://oscahr.unistra.fr/diaporamas/largonne-r%C3%A9gion-foresti%C3%A8re-%C3%A9l%C3%A9ments-de-cadrage-avec-lifn (accessed on 20 October 2023).

[4] The ZARG cooperation network, which has been recognized by the French National Centre for Scientific Research (CNRS) and the Universities of Reims-Champagne-Ardenne, Strasbourg and Lorraine, brings together fifteen local government bodies, public organizations and community issue groups in the Grand Est region (including Argonne Pôle naturel régional), in order to discuss the region's socio-ecological issues.

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Article

A Quantitative Study on the Factors Influencing Implementation of Cybersecurity Laws and Regulations in Pakistan

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Abstract: The phenomenon of law implementation has received limited attention, despite the clear evidence that it is influenced by various factors prevalent in the country, and these factors can have an impact on and obstruct the effective implementation of legislation. The primary objective of this study was to analyze the critical factors that impact the implementation of cybersecurity laws in developing nations, such as Pakistan. The prevalence of corruption, a major hindrance to the implementation of cybersecurity laws and regulations, emerged as the most influential factor in Pakistan. Additionally, factors such as discrimination, illicit conduct, expertise, ambiguity, and public confidence significantly influenced the implementation of cybersecurity laws in Pakistan. A survey was conducted among managers from banking and IT firms to collect data samples on the factors that could potentially impact the implementation of the law. The findings from a sample of 172 respondents revealed that corruption, discrimination, illicit conduct, and ambiguity appeared to have a significant negative influence on cybersecurity law implementation, whereas expertise and public confidence emerged to have a significant positive influence on the implementation of cybersecurity laws in Pakistan. This study suggests that the government of Pakistan should consider various measures such as providing training, improving capacity building, fostering institutional cooperation, strengthening legislative conviction, and promoting global collaborations to enhance the implementation of cybersecurity.

Keywords: cybersecurity law and regulations; implementation; corruption; Pakistan

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1. Introduction

The governments and the crucial infrastructure institutions providing important services to nations are continuously under threat today (Bronk and Conklin 2022; Firdous 2018; Slipachuk et al. 2019). Organized hacker organizations, individual hackers, and groups are all targeting these institutions with modern cyberattacks. The frequency, magnitude, and intensity of cyberattacks have boosted over the past decade persistently (Buzdugan and Capatana 2022; Cabaj et al. 2018; Kure et al. 2022). Whenever any nation's security is attacked, the government reacts by enacting legislation to safeguard their assets, shield their citizens, and avoid such assaults from happening in the future. The nations regulate and implement different laws in their jurisdiction appropriate to cybersecurity, incorporating the laws applicable to the monitoring, detecting, preventing, mitigating, and managing such attack threats (Abdullahi et al. 2022; Bokhari and Myeong 2023). Such laws include, for instance, information security laws, intellectual property laws, cybersecurity laws, data protection and e-privacy laws, and confidentiality laws, among others (Kosseff 2017).

Cybersecurity law establishes socio-legal sanctions for cybercrime; categorizes morals of adequate conduct for information and communication technology (ICT) users, guards ICT operators overall, and alleviates and/or avoids harm to data, systems, people, infrastructure, and services in specific; empowers the investigation and trial of criminalities committed online; protects human rights; and facilitates collaboration (UNODC 2013). Cybersecurity law establishes guidelines of standards and comportment of behavior to

utilize the computers, Internet, associated digital technologies, the activities of government, public, and private institutions; rules of criminal process and evidence, along with other criminal justice questions in cyberspace; and guidelines to condense risk and/or alleviate the destruction instigated to individuals, institutions, and infrastructure in the occurrence of a cybercrime. Consequently, cybercrime law incorporates substantial, procedural, and preemptive law (Kosseff 2017).

Cybersecurity law contains statutes that ban forms of cybercrime and penalize noncompliance with these statutes. Cybercrime encompasses both real-world (offline), traditional crimes (e.g., fraud, money laundering, organized crime, forgery, and theft) committed in cyberspace as "hybrid" or "cyber-enabled" crimes and "new" or "cyber-dependent" offenses made promising directly by the "Internet" and by "Internet-enabled digital technologies" (Chizanga et al. 2022; Kosseff 2017; Marcacci 2022). As a result of these factors, numerous nations have enacted legislation aimed explicitly at combating cybercrime. To combat cybercrime, the United States, the United Kingdom, Germany, Japan, and China, for example, have revised pertinent portions of their penal codes. Countries have also leveraged existing statutes meant for offline (real-world) crime to pursue specific cybercrimes and cybercriminals (Lim and Taeihagh 2018). In Pakistan, for instance, the existing civil law (Prevention of electric crime act 2016) and Pakistan Penal Code, 1860 (Act, LV of 1860) are utilized to punish real-world crimes such as blackmailing, fraud, identity theft committed via the Internet and digital technologies (Firdous 2018; Ministry of Information Technology & Telecommunication 2021).

In today's world, having cybersecurity rules and regulations is essential, but putting such laws into action is critical and unavoidable. Policy implementation has been a little-researched process, despite the fact that it has become clearer that the legislative preparation, policy approval, and application procedures may influence and delay potential legislative implementation. Although influencing factors to implement public laws are discussed in previous studies (Awan et al. 2019; Janssen et al. 2020), cybersecurity laws implementation is widely neglected. We tried to explain in this study the pertinent factors that may influence the implementation of cybersecurity laws in different countries positively or negatively. The past presence in the state of mechanisms for interagency planning to implement legislative policies appeared to be the most relevant factor in different nations. Numerous researchers previously depicted the importance of cybersecurity law (Tarter 2017; Veale and Brown 2020) and implementation of cybersecurity law (Azmi 2020; Sattar et al. 2018), and a few have described the important factors that can influence the implantation of cybersecurity laws in different countries (Goel 2020). Our study will explain different elements and factors that influence the implementation of a law positively or negatively in developing economies.

The structure of the study is as follows. Section 2 examines the literature on cybersecurity law, implementation, and influencing factors to lay the groundwork for our theoretical and experimental framework. Section 3 describes the research design, which includes the methods of data collection and analytical measures. Section 4 summarizes the study's findings. Section 5 provides the discussions, and Section 6 suggests the study's implications. Finally, Section 7 contains the conclusions.

2. Literature Review

2.1. Technical Cybersecurity

Cybersecurity comprises the dimensions of human, material, and technical elements. An examination of the various components of cybersecurity is mostly crucial in order to resolve problems or develop security strategies. Technical cybersecurity is a separate field that employs a diverse set of capabilities, competence, and knowledge to ensure the safety of individuals, businesses, and their confidential information. This facet of cybersecurity entails employing state-of-the-art technologies and methodologies to evaluate security risks and deficiencies, as well as to counteract attacks. This is achieved through diverse methodologies and the collaboration of a variety of experts. Technical cybersecurity

employs ethical espionage as a technique to secure us which is commonly known as penetration testing (Munaiah et al. 2019). Ethical hacking entails the engagement of a penetration tester by a corporation or institution to conduct authorized hacking activities on their networks. By portraying an authentic cyberattack, penetration testers can identify vulnerabilities and weaknesses in security that a hacker might possibly leverage, enabling proactive measures to be implemented in order to eliminate such incidents from occurring in the future (Hawamleh et al. 2020).

Technical cybersecurity positions entail the responsibility of devising strategies and creating security technologies to preserve networks and structures (Ma 2021). They have the ability to formulate strategies to preempt attacks and develop countermeasures in the incident of an attack. Technical professionals must possess knowledge and awareness of the dynamic threat landscape, including emerging weaknesses and malware. Technical cybersecurity experts will analyze the virus's manifestation and design software to defend against or counteract its efficient attack. Comprehending and combating malware is a crucial responsibility in the field of technical cybersecurity (Mohanta and Saldanha 2020). Ultimately, individuals employed in the field of technical cybersecurity are responsible for creating cryptographic systems in order to protect crucial and classified information. Consequently, if networks are compromised and data are pilfered, the confidential information will remain undisclosed according to its encrypted condition. These groups also evaluate encryptions to decrypt them if appropriate.

In essence, technical cybersecurity entails leveraging technology to not only help in the situation of cyberattacks but also to safeguard from and preemptively thwart such attacks. Gaining a comprehensive comprehension of both material and human cybersecurity may highlight the distinct nature of such organizations, while also acknowledging their frequent collaboration in resolving problems.

2.2. Cybersecurity Law

When consulting experts, the prevailing definition of cybersecurity is typically aligned with the official definition provided by the US federal government, which states that it is the proficient protection of computers against unauthorized access or criminal exploitation, as well as the implementation of policies to guarantee the anonymity, credibility, and accessibility of information (Kosseff 2017). The definition provided is insufficient. What constitutes "unauthorized" access, what constitutes "criminal" use, from whom should information be kept "confidential", and who has the authority to determine the integrity and availability of information? Essentially, who has the right to manage which computer? Given our recognition of the significance of cybersecurity law, we have the opportunity to expand cybersecurity avoiding excessive rationalization. Cybersecurity is achieved when the individuals who have the legal authority to control computers and information are the ones who actually possess that control. Cybersecurity issues emerge when there is a mismatch between those who have the ability to control and those who are legally authorized to do so (Goldfoot 2018). A comprehensive awareness of cybersecurity relies on a collective agreement regarding the laws, rules, and policies that establish ownership, authorization, and control. Those rules are legally cybersecurity laws (Appazov 2014).

Cybersecurity is the cumulative application of strategies, security precautions, threat management techniques, training, methodologies, assurance, and competence that may be utilized to protect an information system, an organization, and any associated assets (Möller and Haas 2019). The capacity of an organization to detect and successfully respond to cybersecurity invasions and intrusions, data theft and intellectual property, phishing assaults, and malicious attacks from both inside and outside the network is referred to as cybersecurity readiness (Tran 2016). According to (Richmond 2017), companies should be concerned about whether they are appropriately equipped to identify assaults, immediately notice a breach, efficiently repair, and accurately quantify the harm. Cybersecurity preparedness demonstrates an organization's attitudes, policies, and processes toward

risk management, establishing effective cybersecurity controls, teaching staff about cyber hazards, and recognizing and responding to attacks.

To comprehend "cybersecurity law", for legislators, courts, regulators, and commentators to offer solutions to these ongoing threats, a clear definition is required. We present here some definition elements based on our history of dealing with tragedies such as the threats and attacks on various companies and institutions in various countries. This section determines a broad definition of "cybersecurity law." Kosseff (2017) formed the definition by following five questions what, where and whom, how, when, and why to secure? Taking these factors into account, he created a broad and flexible definition that outlines the basic criteria and applicability of cybersecurity law. He did not intend to imply that cybersecurity law should be restricted to a specific set of prerogatives of policy by providing this definition. Instead, it identifies the areas which should be considered as we advance and improve cybersecurity legislation. "Cybersecurity law promotes the confidentiality, integrity, and availability of public and private information, systems, and networks, through the use of forward-looking regulations and incentives, to protect individual rights and privacy, economic interests, and national security" (Kosseff 2017, p. 1010).

This interpretation of "cybersecurity law" incorporates our modern concept of cybersecurity and identifies the most advanced threats that nations face today. Furthermore, this is just one sample studied on our current national cybersecurity threats, and it makes no substantive policy recommendations for improving cybersecurity. It somewhat characterizes priority sectors of cybersecurity law that are underserved by legislative requirements in various countries. As legislators and courts confront cybersecurity law, it is becoming particularly crucial that they use a prevalent categorization and have a comprehensive understanding of all areas that their legislations, regulations, and judicial rulings should encompass.

Because the government's cybersecurity laws are lenient, people are not precluded from committing crimes. The strict laws are required to instill fear in the minds of prospective criminals so that they know that they will face repercussions if they commit the crime (Gallagher et al. 2015). It is critical to instill fear in the public's mind about any crime, particularly cybercrime, which can be accomplished by enacting harsh punishments. Criminal sanctions do not imply that a person will be appropriately punished for any minor offense, but rather that the conviction must be severe enough that the perpetrator will not intend to commit an offense again, and any prospective offender will be scared by recognizing the repercussions. When punishing an offender, there should always be equilibrium so that it is neither too severe that he must endure beyond what he did, nor too light that he would not worry about having committed it again (Gallagher et al. 2015). Strictly implementing cybersecurity laws can have the effect of discouraging potential offenders, preventing serial offenders, and creating harmony in a community with reduced cyberattacks.

2.3. Implementation of Cybersecurity Law

The law procedure requires an effective implementation framework. Superior implementation is required because no matter how stringent the laws that have been passed by the parliaments, they are useless unless they are implemented properly. The asserted or recommended laws will be of no use unless they are effectively implemented. Police, prison authorities, investigators, and other key players are required for better implementation. The law enforcers are the ones who are tasked with ensuring the public's safety. They are the ones who show up at a criminal investigation and are given the authority to apprehend the perpetrators and bring them before the prosecution. As a result, the security forces must function efficiently to apprehend the attacker as quickly as possible to provide justice to the defendant. Better implementation of cybersecurity policies may grant security and law enforcement agencies more power, instill fear in the community, particularly offenders, and aid in the proper functionality of the judicial process.

The combined effect of stricter legislation and improved implementation is critical. Stringent laws combined with better implementation would produce the desired outcome since neither draconian law nor better implementation could function alone to eliminate

offenses from society. The lengthy court procedures in which the defendant seeking retribution for oneself must wait for years cause the victim to lose faith and the suspected to flee. The public is skeptical of such a delayed and tedious process because they understand that if they bring any case to the court, they will not find justice on time. The source of such skepticism is lax legislation and poor implementation. Whenever the prosecutors work efficiently, the judges can reach a decision more quickly, and stringent laws discourage the public from perpetrating future crimes. Both would thus help to prevent crime in the country and develop peace and stability.

Security forces may take a variety of interventions to deliver justice to the people, together with stricter laws and strict enforcement. For instance, a defined time limit can be suggested for discharging cases so that the complainant does not have to struggle more to obtain justice, a fixed punishment can be asserted for the offenses rather than the upper and lower limits provisions, the sanctions can be given according to the seriousness of the offense so that people would not commit those offenses, cases including cybercrimes or any severe cases can allude straightforwardly to the Special Courts for prosecution, and bail should never be granted to severe criminals. Figure 1 displays a step-by-step flowchart of the cybersecurity lawmaking and implementation process in Pakistan.

2.4. Factors Influencing Implementation of Cybersecurity Law

Most of the nation-states have laws and regulations regarding cybersecurity in existence since 2014, with fewer added later on (Burr 2015). For a variety of reasons, effective legislation and regulatory implementation remain a major challenge. Among these is the fact that cybersecurity laws and regulations must pass through several institutions, both public, semi-public, and private. All these institutions have overlapping processes that impede their effective implementation. Because of these overlaps, the country's administration's complicated pyramidal structure, and a lack of cooperation across agencies, the execution of current rules is difficult to observe and deploy in its completeness. Nevertheless, the information sector's rules are the responsibility of numerous authorities, the primary role of which is to "guarantee that the cybersecurity process must be carried out rigorously in compliance with all applicable by-laws." They are generally (but not exclusively) under the supervision of the Ministry of Information Technology. Nonetheless, numerous other ministries, such as the Ministry of Interior and the Ministry of Science, have major powers in the formulation and execution of different policies and instruments in the information technology industry at large (Tene et al. 2017).

It should be noted that collaboration across all ministries in the security process is quite weak. This may be evident at the legislative, administrative, and policy implementation levels, which eventually leads to inadequate execution and implementation of existing laws and regulations (L. J. Bikoko et al. 2019). This position raises additional worries regarding the nature of policy development in the country and in cybersecurity specifically. In this latter sector, it has been seen that cybersecurity breaches and, as a result, the collapse of cybercrime have approached an astonishing rate in recent years (Rasool 2015). These results, as well as policy structures among several ministerial departments, may have contributed to the shortcomings.

Law enforcement is vital in states, thus more demographic knowledge is essential to have a detailed understanding of the elements that might affect law enforcement regionally (Clark 2002). In the past, the state of mechanisms for law implementation development plans appeared to be the most important element in a country. Prior history of federal programs, resource availability, state wealth, or geographic location did not appear to have a substantial impact on policy formation, but there are some indicators that other elements may become relevant in the following stage of legislation implementation, policy acceptance (Harbin et al. 1992). It indicates that several variables such as inadequate resources (Burns et al. 2004), corruption (Polinsky and Shavell 2001), insufficient knowledge, ambiguity about law enforcement (Chopard and Obidzinski 2021), a willingness on the

part (Bolger and Walters 2019), and low confidence (Hall 2012) are influencing progress in the application of cybersecurity regulations. These elements are detailed more below.

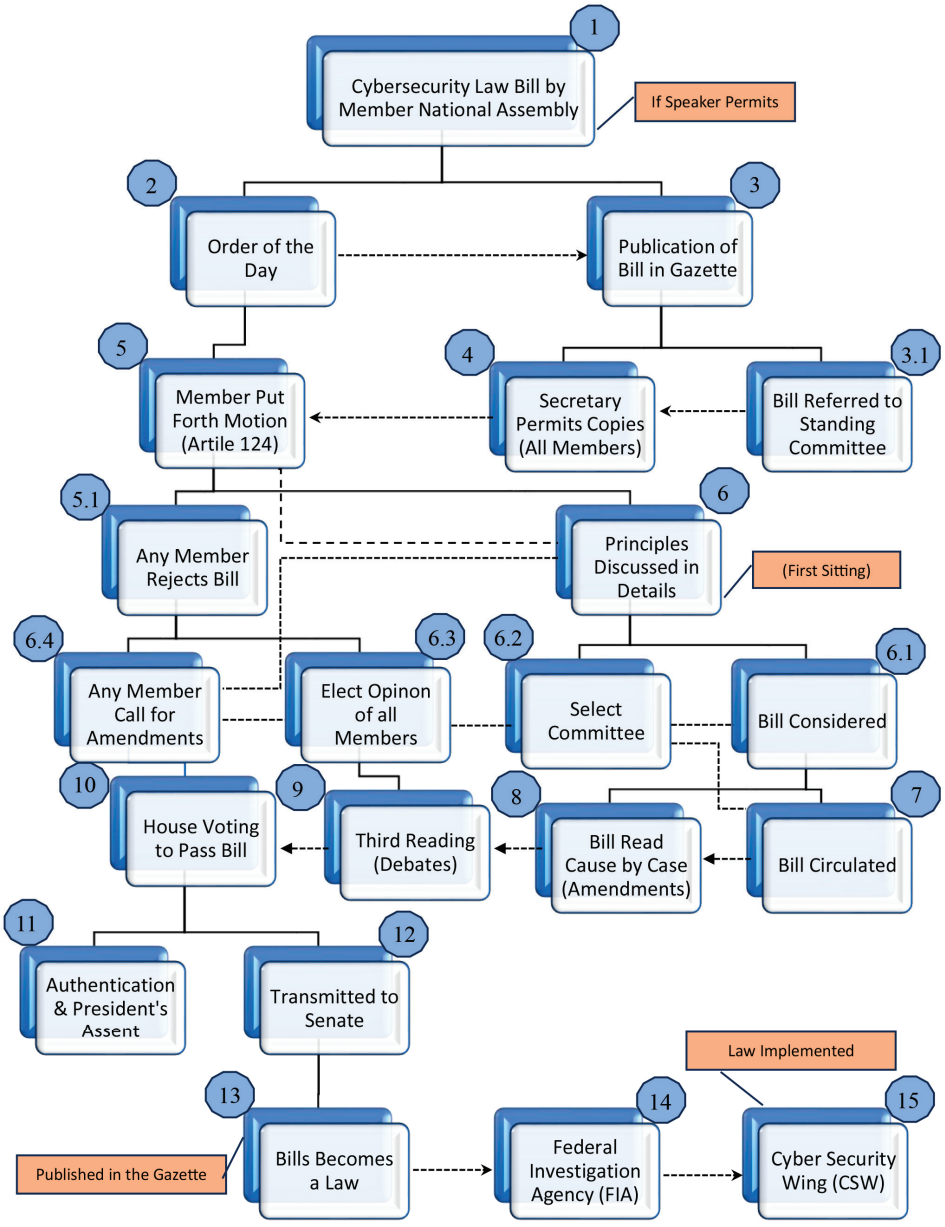

Figure 1. Procedural Flowchart of Cybersecurity Law Implementation.

2.4.1. Corruption and Law Implementation

Law enforcement agencies oversee and implement laws designed to protect those who engage in cybercrime, Internet fraud, and cyberattacks. Corruption makes law enforcement a far less reliable weapon for minimizing and avoiding cybersecurity damages (Kolstad and Søreide 2009; Parker 2019; Robbins 2000). Contributing to the difficulty is the reality

that cybercrime is a minor issue for law enforcement agencies in many nations, specifically if they are under-resourced and confront a variety of other challenges to the legal system. Such crimes may even be seen as having no victims (Williams 2019). Corruption is defined as the misuse of delegated power for personal benefit. Bribery and extortion, granting benefits in return for campaign donations, favoritism, and embezzlement, are all forms of corruption.

Corrupt behaviors frequently intersect with cybercrime, and corruption is frequently used as a "door opener" for cybercrime. Bribes or gratuities to support the international or domestic usage of unlawful or unauthorized hacking, ransomware and malware distribution, and denial of service; bribery for a favorable decision or other judicial process manipulation; employing illicit ways to launder the revenues of cybercrime and associated corruption are some instances of cybercrime-related corruption (Williams 2019). Because of the prevalence and influence of corruption, efforts to decrease cybercrime through law enforcement may have unintended or unexpected consequences. This notion is illustrated by two basic approaches in which corruption may weaken law enforcement.

Throughout several historical decades, traditional states engaged in battles against different challenges in order to protect their freedom, territorial boundaries, socioeconomic equilibrium, sustained functioning, and development. In most present-day nations, owing to their elevated levels of development, societies are experiencing novel types of challenges due to the digitalization and swift development of cyber technology consisting of cyberthreats. Therefore, modern nations are obligated to propose efficient governmental policies to combat the aforementioned issues and protect information, preservation of national sovereignty, security, and continued survival in a transformed digital environment. Corruption poses a significant threat to virtual reality, as evidenced by previous studies (Holovkin et al. 2021; Richards and Eboibi 2021). Currently, the progress of the information state relies on the policies made by those in the government, in addition to its socioeconomic and technological aspects. If a country's government involves corruption in the decision-making process across various disciplines, this indicates that corruption poses a significant risk to cybersecurity (Abbas et al. 2021). Its significance is highly substantial because of the global development in informatization and the overall shift from conventional to digital paradigms. As corruption becomes more prevalent, the cybersecurity infrastructures of certain countries and the global world become increasingly susceptible to cyberattacks (Bechara and Schuch 2021; Hauser 2019; Lallie et al. 2021; Suwana and Sardini 2022). We argue that when a country's government is involved in corrupt practices in policy-making processes, it is highly vulnerable to implement those laws. Based on the above discussions, we developed our first hypothesis as follows:

Hypothesis 1. *The higher the perceived corruption in the society, the lower the likelihood of implementation of cybersecurity law.*

A. Discriminatory or Selective Ground-Level Implementation

Corruption can steer implementation toward less powerful entities and relatively low criminal activity. Lower-level offenses, such as traffic infractions or hunting, are not only relatively simple to detect, but they also present possibilities for law enforcement agents to extort bribes due to their superior position of power and influence in the scenario. When bribes are passed up the bureaucratic chain, this generates attractive benefits inside the administration to spend law enforcement resources on initiatives that maximize bribe collection potential. Where there are fewer options for remuneration, there is less motivation to pursue illicit actions. This also means that illicit actors who can afford to pay can avoid arrest or conviction (Williams 2019). In Pakistan, for instance, corruption is contributing to the demise of Pakistan's forest management system and highlighting the weaknesses of traditional anti-corruption reform efforts. The "crime and punishment method" and the "holistic approach" are the most frequently referenced reform strategies in the fight

against corruption. The "crime and punishment" strategy necessitates strong enforcement mechanisms, which Pakistan lacks (Chêne 2008; Pellegrini 2011).

Adolescent communities that hold a disadvantageous position in the network of communication and social structures, particularly those who experience multimodal discrimination, are vulnerable to cyberbullying and cyberthreats and often experience negative psychological outcomes. Cyberbullying on the basis of discrimination is a pervasive worldwide social issue (Hong et al. 2018; Peguero and Hong 2020). Cyberbullying can emerge regardless of whether adolescent individuals possess discriminatory characteristics or personalities, although those with such qualities can be more susceptible. Previous studies discovered that discrimination-based cyber harassment tends to include a higher number of attackers, frequent instances, and prolonged periods compared to non-discriminated harassment (Jones et al. 2023; Navarro-Rodríguez et al. 2023). Recently, there has been a growing interest among academics in both conventional bullying and cyberbullying. Due to the absence of cybersecurity laws and of temporal and spatial constraints, cyberbullying can impact more extreme trauma on its victims compared to conventional bullying (Bauman and Yoon 2014). Although discrimination and cyberbullying both arise from a social status asymmetry, it is the government that ensures equality and justice through the implementation of adequate policies in relation to cybersecurity. Additionally, it is worth noting that cyberbullying is primarily prevalent in teenagers (Earnshaw et al. 2018), and the governments neglect this segment of society while making policies. Weinstein et al. highlighted that teenagers may encounter deleterious effects of different kinds when investigating the correlation between perceived discrimination and both offline bullying and cyberbullying (Weinstein et al. 2021). We argue that in cases of significant discrimination among various segments of society, the government of a country is incapable of implementing stringent policies that apply uniformly to all segments. Based on the aforementioned discussion, we proposed our subsequent hypothesis as follows:

Hypothesis 2. *The higher the discrimination in the society, the lower the likelihood of implementation of cybersecurity law.*

B. Involved in the Eradication of Illicit Conduct

Prosecution, juries, and law enforcement personnel can all be influenced by politics or be motivated by corrupt motives. Corruption can lead to less repression of criminal acts, such as during case preparation. In Honduras, for example, state involvement was accused of the destruction of evidence in a lawsuit involving some of the country's top timber corporations (Goncalves et al. 2012). Despite the inability to gather and present important proof that might be attributed to a lack of capacity or inadequate resources, corruption and political meddling are frequently prevalent. Bribe payments to judges, on the other hand, have been shown to influence charge and penalty levels (Williams 2019). Rendering to another research, personnel in Kenya's Forest Service (KFS) have allocated forest areas for forestry and farming in return for unlawful bribes. Attempts to expel forest inhabitants in Kenya's highlands have been regarded as a kind of rent capture and as part of wider historical methods of forced integration. Evacuations also eliminate key witnesses to criminal activity (Cavanagh 2017).

Hypothesis 3. *The higher the illicit conduct of government and law enforcement agencies, the lower the likelihood of implementation of cybersecurity laws.*

2.4.2. Expertise and Law Enforcement

Cybercrime is one of our world's most serious dangers, with far-reaching ramifications for national security, economic strength, and public safety. Investigating a wide range of cybercrimes and cyberthreats perpetrated by cybercriminals, hackers, extremists, and state actors is a problem for the state, regional, local, and territorial law enforcement agencies. To face this problem, cybersecurity law enforcement executives must guarantee that competent

agency workers receive cybercrime training to gain skills in preventing cyberattacks or identifying perpetrators for prosecution in the case of such assaults.

With the advancement of technology and the global availability of the Internet, new forms of cybercrime are emerging daily. As per Mike Hulett, the director of operations of the UK's National Cyber Crime Unit, cyber was engaged in almost half of all registered crimes in the UK in 2017. Furthermore, around 68% of significant UK organizations have been the target of cybersecurity breaches or assaults. Law enforcement is having a difficult time keeping up with the surge in cybercriminals' numbers and the innovation of their techniques. Previous research suggests that the methodologies and processes employed by law enforcement in traditional investigations do not always apply in the cyber environment (Brenner 2010; Williams 2008). Consequently, to neutralize these technologically complex crimes, a new process must be adopted, as well as a new set of expertise and skills. This is critical because cybercriminals are typically technologically savvy and are always changing and developing innovative tools to stay one step ahead of law enforcement agencies (Koziarski and Lee 2020; Nurse 2018).

Technological expertise and skills are problems associated with the staff's cyber competencies. In comparison to developed countries, developing countries have a shortage of trained technical experts working on cybercrime investigations. The majority are highly skilled investigators who have previously worked on street crime but are now transitioning to the cyber field due to the growth in cybercrime. Investigators are well versed in obtaining intelligence and investigative techniques, but they may not be as well versed in cyberspace. As a result, there are still unanswered questions about employee expertise and training in emerging countries. Due to the worldwide increase in cybercrime, this is unlikely to be a problem that exclusively affects this geographic area. Further training and expertise for the appropriate staff, as well as the development of technologies that are better suited to supporting user skills and activities, are all possibilities that could be pursued in the future. The ideal situation would be to provide easy-to-use procedures and technologies that would shorten the acquisition time for new cybercrime investigators (Nouh et al. 2019).

Hypothesis 4. *The higher the expertise of law enforcement agencies, the higher the likelihood of implementation of cybersecurity law.*

2.4.3. Ambiguity and Law Enforcement

Individuals are expected to accurately appraise the likelihood of being penalized if they commit an offense under the civil law enforcement framework (Becker 1968). Nonetheless, in real-life scenarios, prospective criminals usually have only a hazy understanding of their chances of being found and perhaps punished. They have beliefs about the likelihood of discovery and may be optimistic or pessimistic. For example, in the context of corporate taxation, taxpayers tend to exaggerate the likelihood of being subjected to an examination by the tax authorities (Slemrod 2019).

Individuals' decisions on whether to respect the law will be influenced by how they assess their chances of being caught. The likelihood of identification and indictment is uncertain, even though potential perpetrators are fully aware of the severity of the penalty. The fundamental reason for this idea is that punishments are frequently stated in sentencing guidelines or criminal legislation, but information concerning the likelihood of discovery cannot be provided. Furthermore, ambiguity about the severity of punishments raises concerns about the concept of equal treatment under the law (General Assembly 2014). Assume Mr. X and Mr. Y perform the same offense under the same conditions. If Mr. X receives a 5-year sentence and Mr. Y receives a 3-year term, the disparity appears to be highly harsh (Chopard and Obidzinski 2021).

Numerous theorists, based on the predicted general law enforcement framework (Polinsky and Shavell 2007), suggest that potential offenders are aware of their chances of identification and prosecution. The purpose here is looking at how uncertainty about this probability affects the standard conclusions about the optimal punishment and the

resources that benevolent public law enforcement should expend in investigation and conviction. (Snow 2011) defines ambiguity as "uncertainty regarding probability caused by the omission of crucial and potentially available information." There are various possible models of decision when there is uncertainty. In the context of cybersecurity law enforcement, two social welfare factors (populist and paternalist) are examined and determine the best implementation approach in each situation. The major distinction between the two techniques is whether the law enforcement should consider the disparity between the objective and perceived probability of a fine. Indeed, when people are pessimistic, this disparity may result in a perception bias cost (optimistic). A paternalistic state law enforcer does not consider the difference between the predicted and genuine penalty, but a populist law enforcer does (Williams 2019).

The findings suggest that the level of pessimism of potential criminals be considered when designing deterrent strategies. Consequently, attitudes can have a significant impact on deterrence policy suggestions. Assume that people are pessimistic and overestimate their possibilities of being caught and convicted (Chopard and Obidzinski 2021). It is argued that ideal penalties be reduced for two reasons: penalties may be viewed as expensive transfers if society considers mental anguish, and the perceived likelihood of detection is greater than the factual probability. In terms of the best way to invest in an investigation, the outcomes vary depending on the goal role of the law enforcement. When the law enforcer is populist, it is demonstrated that raising the likelihood and lowering the quantity of the fine may be socially acceptable provided the marginal cost of detection is sufficiently low (Williams 2019). In such a circumstance, the fine is not always the maximum. Furthermore, under certain situations, it is feasible that the resources involved in identification are smaller than in the absence of ambiguity. Despite the weight of the beliefs, the objective likelihood of detection looks to be a less effective deterrent strategy in this situation.

Hypothesis 5. *The lower the ambiguity in cybersecurity law, the higher the likelihood of its implementation.*

2.4.4. Public Confidence and Law Enforcement

In a modern democracy, the study of public confidence regarding law implementation is considered significant since the security forces are thought to exemplify the moral integrity and legitimacy of the state (Vaughn et al. 2001). Citizens' impressions of law enforcement services could act as an indicator of a government's performance in serving public needs and interests in this regard. Additionally, the public's overall attitude toward the authorities (i.e., confidence in the law enforcement, contentment with the authorities, and faith in the system) can influence the prosecutor's social control role through its impact on citizen support and collaboration (Holmes and Goodman 2010; Karakus et al. 2011). Public confidence in law authorities and the effectiveness of law enforcement agencies has been shown to boost citizens' readiness to exercise opportunities to avoid cyberattacks and cybercrimes in society (Gross et al. 2017).

Even though research conducted over the last three decades has revealed that the public at large has favorable perceptions toward the law enforcement agencies (Karakus et al. 2011), differences in citizens' attitudes have been discovered depending on the set of parameters (gender, age, socioeconomic level, civil status), neighborhood quality of life (disorder, fear of crime, neighborhood satisfaction), and interactions with the security forces (Schafer et al. 2003). Nevertheless, it is crucial to highlight that most of the past studies have been conducted in the United States and other English-speaking/developed countries (Benedict et al. 2000), and little is known about public perceptions regarding security services in developing countries (Akhtar et al. 2012; Jackson et al. 2014). The validity of current models and related outcomes clarifying variability in the public's view of law implementation across different ethnicities and contextual factors is thus called into question, as current understanding may be constricted or even subjective because of the near-unique emphasis on the United States and other developed countries. According to the scarce study undertaken in developing nations, for example, the public sees law

enforcement less favorably than the populace of wealthy countries. These unfavorable sentiments against the law enforcement agencies can lead to mutual ill will, a lack of respect, chaos, and ineffective law enforcement functioning (Benedict et al. 2000).

Hypothesis 6. *The higher the public confidence in law enforcement agencies, the higher the likelihood of implementation of the law.*

3. Research Methods

3.1. Research Design and Sampling

The data were collected from a survey questionnaire administered on a quasi-random basis to managerial-level personnel employed in various banks and IT companies, applying a correlational approach (all Pakistan-based, private-sector firms in the service rather than the production sector). To safeguard employee privacy, questionnaires were answered and submitted directly to the authors via email and an online questionnaire. Study participants were informed that the study was engaged with how various factors influence the implementation of cybersecurity laws in different countries, specifically in the context of Pakistan's developing economy. The reason behind selecting two sectors, such as banks and IT corporations, was that these sectors are the most vulnerable to cyberthreats and would prefer cybersecurity laws to be implemented.

A total of 1020 questionnaires were delivered, with questionnaire responses acquired from 172 male and female personnel, ages ranging from 22 to 60 years. This corresponds to 16.7%, which is a satisfactory percentage considering the commonly minimal response rates acquired from questionnaire surveys (Baruch and Holtom 2008). The sample included 108 men (63%) and 64 women (37%). Participants functioned in a wide range of departments. This classification is divided into multiple groups, each with a variety of jobs, starting from developers and professionals in the first group to higher-level managers. Table 1 summarizes the individuals' characteristic categories to which the sample belonged.

Table 1. Demographics Characteristics.

Description	N	%
Age		
22 to 35 years	112	65
36 to 50 years	55	32
51 to 60 years	05	03
Gender		
Male	108	63
Female	64	37
Sector		
Banking firms	106	62
IT firms	66	38
Position		
Low-level managers/Supervisors	102	59
Middle-level managers/Operations managers	52	30
Full managers/Branch managers	18	11

3.2. Variable Assessment

3.2.1. Corruption

Corruption was measured in this study using five scales: bribery at the government official level, anti-corruption department authority, corruption risk assessment by the government, anti-corruption training programs, and anti-corruption audit programs in public departments (Bokhari 2022).

3.2.2. Discrimination

The variable discrimination is defined in this study as the unfair or deceptive exploitation of groups and individuals depending on attributes such as ethnicity, race, religion, or sexual preference. This variable was adapted from Clark et al. (Clark et al. 2004), using five scales such as being regarded with less decency, receiving terrible services, having been intimidated or humiliated, being handled with disrespect and deception, and being convicted with injustice.

3.2.3. Illicit Conduct

Illicit behaviors are deemed insensitive or socially unacceptable; activities might not always be unlawful but, nevertheless, violate societal values and norms. Illicit conduct in this study is adapted using five items such as lack of awareness of legal requirements, lack of intelligence in a specific profession, numerous breaches of law, promoting any fraudulent activity or crime, and use of brutal or barbaric behavior (Tremblay 2018).

3.2.4. Expertise

Expertise is commonly described as an exceptional, elite, or extraordinarily high degree of competency in a specific function or subject. To measure this variable, we utilized five components such as the extent of decision-making capability, level of anger management, institutional loyalty, cognition of responsibility, and intensity of analytical thinking, which were adapted from (Ohanian 1990).

3.2.5. Ambiguity

When the connotation, expression, or statement is unclear, ambiguity emerges, and there might be more than one interpretation. Ambiguity in this study is defined as the perception of criminals usually having only a vague understanding of their chances of being observed and perhaps punished by law enforcement institutions. This variable was constructed using five elements adapted from (Calford and DeAngelo 2022). Those elements were uncertain protective remedies against illegal activities, anxiety whenever anything unprecedented occurs, managing a fragmented endeavor, continuing going forward in a hazardous or confusing scenario, and making decisions in the context of uncertainty.

3.2.6. Public Confidence

Maintaining public confidence is fundamental for every law to be capable of protecting the community. Because the general population is a significant source of information, public confidence and collaboration are frequently essential to law enforcement. Public confidence in the state legislative assembly, confidence in the country's constitution, faith in the state's law enforcement agencies, trust in the country's politicians, and confidence in the country's judicial system were the components adapted (Hooghe and Kern 2015) to measure the public confidence construct.

3.2.7. Implementation of Cybersecurity Law

Five elements were applied to measure the implementation of cybersecurity law, and they were adapted from (Rafiq 2019), such as the availability of cybersecurity rules and regulations, the audience's role in implantation, the development of effective legislation, safeguarding them in place of the nation, and synthesizing before stratification.

3.3. Research Analysis

To examine our hypotheses and interpret the outcomes, we employed IBM SPSS 23. The hypothesized research framework for this study is given in Figure 2, where corruption, discrimination, illicit conduct, and ambiguity are negatively impacting whether expertise and public confidence are positively influencing the independent variables on implementation of cybersecurity law, the dependent variable. We will resume interpreting the results of our hypotheses investigation in the following section. The measuring model's reliability

and validity were examined initially. Following that, the hypotheses were examined by applying linear regression and robust standard errors. Figure 3 presents a comprehensive roadmap to test the hypotheses developed in this study.

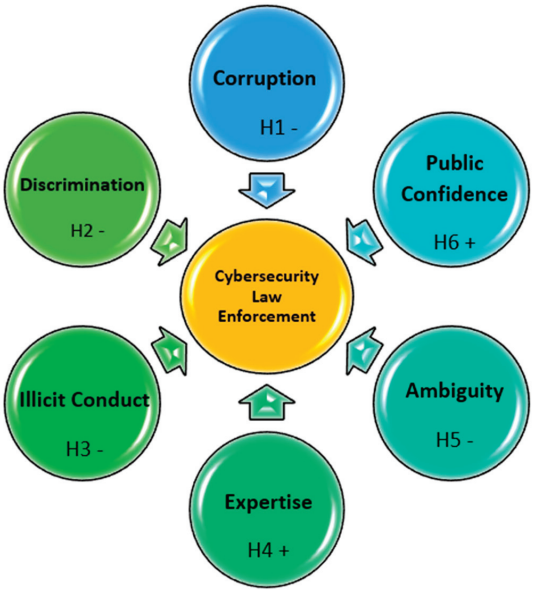

Figure 2. Research Framework.

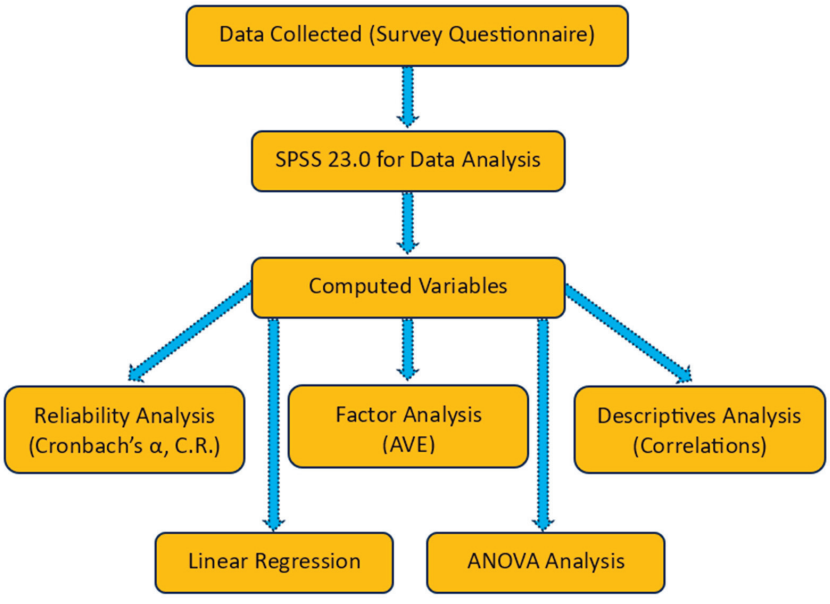

Figure 3. Roadmap to Test Hypotheses.

4. Findings

4.1. Reliability and Validity Findings

Table 2 shows how the reliability analysis and discriminant validity of the instrument's models were evaluated before putting them to the examination. Composite reliability (CR) is an indicator of internal consistency. The composite reliability test results demonstrate that all elements have ratings larger than the widely accepted criteria of 0.7 (Abdillah and Hartono 2015). CR, Cronbach's alpha, and AVE were all examined in the convergent reliability analysis. To start, all the substances exhibit statistical significance in Cronbach's alpha. This result indicated that all elements linked to their components confirm the hypothesized association between the indicators and the substances. Secondly, the average variance extracted (AVE) values in all research models exceeded the 0.50 cut-off threshold (Abdillah and Hartono 2015). Therefore, it indicated that the provided indicators may be used using all of the convergent validity factors.

Table 2. Construct Reliability with Cronbach's Alpha, Composite Reliability, and AVE.

	N	Cronbach's Alpha	CR	AVE
Overall Cronbach's Alpha = 0.979				
Corruption	5	0.817	0.882	0.600
Ambiguity	5	0.894	0.927	0.719
Discrimination	5	0.915	0.939	0.757
Illicit Conduct	5	0.968	0.976	0.890
Public Confidence	5	0.842	0.888	0.615
Expertise	5	0.741	0.921	0.795
Cyber Law Implementation	5	0.823	0.894	0.764

The discriminant validity experiment was conducted to investigate how widely the variables differ. To show construct validity, the AVE of the component should be greater than the variation explained by that item and all other items in the model (Abdillah and Hartono 2015). This condition was generated by all components in this investigation; especially, the diagonal entries (AVEs) in Table 2 are larger than the corresponding components. In sum, the modeling analyses exhibited promising support for the validity and reliability of the effective implementation of the constructs.

4.2. Hypotheses Testing

Table 3 shows the values of mean, standard deviations, and correlation matrix for cybersecurity law implementation, corruption, discrimination, illicit conduct, expertise, ambiguity, and public confidence. The matrix demonstrated a strong correlation between the independent variables (corruption, discrimination, illicit conduct, expertise, ambiguity, and public confidence) and the dependent variable (i.e., cybersecurity law implementation). These observations indicate and validate the researchers' concerns for the interconnection of cybersecurity law implementation, corruption, discrimination, illicit conduct, expertise, ambiguity, and public confidence. All correlation coefficients are in the indicated patterns, implying that assumptions such as cybersecurity law implementation being connected to corruption ($r = -0.449$, $p < 0.01$), discrimination ($r = -0.626$, $p < 0.01$), illicit conduct ($r = -0.573$, $p < 0.01$), expertise ($r = 0.712$, $p < 0.01$), ambiguity ($r = -0.668$, $p < 0.01$), and public confidence ($r = 0.624$, $p < 0.01$) should be examined further (Bokhari and Myeong 2022).

Table 4 presents the empirical outcomes of a univariate analysis of variance performed with ANOVA. The one-way ANOVA should be used when there are three or more groups and only one independent variable and one dependent variable. Because there are six independent variables in this study, the univariate analysis of variance is incorporated into a two-way ANOVA. In this method, the interactivity of the endogenous variables, including the overall influences of the factors, should be studied. Because of the complexities, prior scholars suggested avoiding using beyond three attributes. Table 4 illustrates the F-model

value, which is 355.738, and the p-value is less than 0.01, indicating that our argument is correct and that the relationships are substantial.

Table 3. Statistical Descriptive, Mean, Standard Deviation, and Pearson Correlations.

	N	M	SD	Gen	Age	Pos	CLI	COR	PC	EXP	DIS	IC
Gen	172	1.343	0.476	1								
Age	172	2.256	0.438	0.054	1							
Pos	172	3.401	0.492	0.258 **	0.472 **	1						
CLI	172	3.68	0.501	0.052	0.038 *	0.034 *	1					
COR	172	3.787	0.645	−0.075	−0.076	−0.021	−0.449 **	1				
PC	172	3.809	0.778	0.029 *	0.045 *	0.034 *	0.624 **	0.887 **	1			
EXP	172	4.053	0.826	0.060	0.035 *	0.007 **	0.712 **	0.879 **	0.959 **	1		
DIS	172	0.901	1.009	0.027 *	−0.054	−0.14 *	−0.626 **	0.846 **	0.957 **	0.977 **	1	
IC	172	3.958	0.673	0.052	0.035 *	0.006 **	−0.573 **	0.908 **	0.920 **	0.923 **	0.890 **	1
AMB	172	3.857	0.667	−0.030 *	−0.074	0.042 *	−0.668 **	0.881 **	0.906 **	0.925 **	0.933 **	0.869 **

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed). Note: M = Mean; SD = Standard Deviation; Gen = Gender; Pos = Position; CLI = Cybersecurity Implementation; COR = Corruption; PC = Public Confidence; Exp = Expertise; DIS = Disinformation; IC = Illicit Conduct; AMB = Ambiguity.

Table 4. ANOVA Test.

ANOVA [a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1994.493	9	221.610	355.738	0.000 [b]
	Residual	100.920	162	0.623		
	Total	2095.413	171			

[a] Dependent Variable: CL_Implem. [b] Predictors: (Constant), Ambiguity, Gen, Age, Pos, Ill_Conduct, Corruption, P_Conf, Expertise, Discrimination.

The outcomes in Table 5 reveal that corruption had a highly negative direct influence on cybersecurity law implementation, with a path coefficient (β = −7.361; t-value = −27.429; $p \leq 0.000$). This result indicated that hypothesis 1 is highly substantiated. Hypothesis 2 indicated a substantial negative relationship between discrimination and cybersecurity law implementation, as postulated, with a path coefficient (β = −10.434; t-value = −29.575; $p \leq 0.000$). Hypothesis 3 substantiated the predicted causal link between illicit conduct and with a path coefficient (β = −0.974; t-value = −3.331; $p \leq 0.000$). Hypothesis 4 suggested that expertise has a positive influence on cybersecurity law implementation, and outcomes revealed a substantial positive relationship between these two constructs with a path coefficient (β = 14.019; t-value = 33.164; $p \leq 0.000$), demonstrating that H4 is substantiated. Hypothesis 5 anticipated a strong inverse relationship between ambiguity and cybersecurity law implementation. The outcomes substantially supported our prediction, with a path coefficient (β = −6.725; t-value = 23.041; $p \leq 0.000$) confirming support for H5. Finally, Hypothesis 6 anticipated a substantial relationship between public confidence and cybersecurity law implementation. The result substantially supports our prediction, with a path coefficient (β = 2.428; t-value = 7.293; $p \leq 0.000$) confirming H6. The research framework analyzed the square multiple correlation (R2) coefficients for latent variables to examine the variance of the latent constructs. The structural model correlations (R2) findings in Table 5 indicate that the proposed model reflected statistically substantial variance for the outcome variable (Tewamba et al. 2019).

Table 5. Hypothesis Testing using Linear Regression for Independent and Dependent Variables.

Coefficients					
Model	**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
	B	**Std. Error**	**Beta**		
(Constant)	−7.198	0.705		−10.214	0.000
Gen	−0.086	0.133	−0.012	−0.643	0.521
Age	−0.029	0.159	−0.004	−0.184	0.854
Position	0.111	0.146	0.016	0.763	0.447
Corruption	−7.361 **	0.268	−1.357	−27.429	0.000
Public Confidence	2.428 **	0.333	0.540	7.293	0.000
Expertise	14.019 **	0.423	3.307	33.164	0.000
Discrimination	−10.434 **	0.353	−3.007	−29.575	0.000
Illicit Conduct	−0.947 **	0.284	−0.182	−3.331	0.001
Ambiguity	−6.725 **	0.292	1.282	23.041	0.000

Model Summary			
R	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
0.976	0.952	0.949	0.7893

Dependent Variable: Cybersecurity Law Implementation. **. Correlation is significant at the 0.01 level (2-tailed).

5. Discussion

There are significant serious cyber hazards to Pakistan's state sovereignty, and without the security of certain challenges, comprehensive cybersecurity is unlikely to be attained. Several securitized initiatives were launched by government entities during the last decades; however, most were unsuccessful. The inappropriate media narrative of cybersecurity policies, the scarcity of appropriate authorities, broad-scope security discussions, conventional security mindset, and public exclusion are the key obstacles to effective cybersecurity implementation in Pakistan. The digital media network and authoritative cybersecurity perspectives might contribute to achieving intersubjective consensus amongst essential players. The unification of such an interpretive consensus with the discourse actions could alleviate difficulties concerning the public's involvement. Moreover, identifying the significant associations, stagnating players, and elements in the armed services, economical, geopolitical, and social dimensions that construct the security risk matrices working in the cyber world is crucial. Rather than the rigorous and conventional laws of the existing security cultures, cybersecurity threats must be addressed with an advanced and efficient series of standards (Rafiq 2019).

The primary goal of this research was to identify the critical factors that may influence the implementation of cybersecurity laws in developing economies such as Pakistan. This study found a substantial negative association between corruption and cybersecurity law implementation ($r = -0.449$, $p \leq 0.01$), discrimination and cybersecurity law implementation ($r = -0.626$, $p \leq 0.01$), illicit conduct and cybersecurity law implementation ($r = -0.573$, $p \leq 0.01$), and ambiguity and cybersecurity law implementation ($r = -0.668$, $p \leq 0.01$). Furthermore, the statistical results demonstrated a significant positive relationship between expertise and cybersecurity legislation implementation ($r = 0.712$, $p \leq 0.01$) and public confidence and cybersecurity law implementation ($r = 0.624$, $p \leq 0.01$). As a result, all hypotheses 1 through 6 were significantly supported.

These findings suggested that ambiguity in law and regulations, the illegal actions of attackers who understand they could be sheltered by bribing officials, discrimination in the society, and corruption in government institutions are among the most significant factors that could have a deleterious influence on the implementation of cybersecurity laws in Pakistan. For cybersecurity laws in Pakistan to have a stronger impact, the government must attempt to clarify existing laws, reduce institutional corruption, and eliminate discrimination. However, the implementation of cybersecurity laws in developing economies is hampered by problems regarding the staff's technological expertise and cyber competencies.

The public's trust in the security forces is also deemed crucial to the success of cybersecurity law enforcement because of the high esteem in which they are held as symbols of the state's moral rectitude and legal authority. While the public shows faith in the state's security forces, Pakistan's new cybersecurity law may be implemented overwhelmingly. The findings of this study are generalizable to other countries, particularly those in Asia, because of the similarities between them in terms of corruption, staff expertise, public confidence, and discrimination.

6. Implications

This study may have the following implications for the government to adopt to strengthen cybersecurity implementation in Pakistan:

Training, capacity building, and institutional cooperation: The findings of this study suggest that apprenticeships and workshops for improving cybersecurity competencies ought to be coordinated with the National Center for Cyber Security to strengthen the technological skills of personnel. Personnel orientation on the relevance of cybersecurity should be conducted to enhance knowledge of precautionary measures for preventing cybercrime. Pakistan's law enforcement agencies have collaborated with several highly experienced entities in the information technology sector, such as FIA and NADRA, to strengthen HR professionals' capacity to cope with cybersecurity and hazards. Furthermore, undoubtedly civil–military collaboration in cybersecurity is essential, and it is essential to guarantee that the civil–military institutions set their rivalry aside. Assuming that governmental prejudices are eliminated, essential cybersecurity synergies might be achieved (Anwar and Yamin 2021).

Legislative conviction: The outcomes of this study suggested that corruption, illicit conduct of attackers, and ambiguity in laws impact law implementation adversely. While a cybercrime is committed, there must be a legislative conviction from the courts. Emergence in the field of cybersecurity refers to the availability of a cybersecurity memorandum that can be used as a standard against which all actions taken in the name of information security can be measured. The implementation of cybersecurity programs and strategies should be aligned with the government's national initiative to promote internal cybersecurity ecology. The national strategies involve both operational and regulatory measures, such as organizational operating standards, institutions managing cybersecurity, HR capacity building, and endeavors to strengthen global collaboration. Furthermore, the anti-corruption department should take strong measures to prohibit unethical conduct that can jeopardize the implementation of cybersecurity laws and increase cyber hazards.

Global collaborations: Globalization with states and international institutions is also crucial to confronting cybercrimes. Pakistan has collaborated with China to counter cybercrime for not only political and regional stability but also many other interests. Considering those ambitions, Pakistan and China's determination to develop cooperation through the "China Pakistan Economic Corridor" (CPEC) suggests that it is fulfilling the strategic milestone of establishing a foundation in cybercrime deterrence and economic expansion (Chang and Khan 2019). Table 6 provides the comparison of results with efficacy to prove the efficiency of the proposed method of this study.

Table 6. Comparison to Prove the Efficiency of the Proposed Method.

	Effect	Efficacy	Method
COR → CSLI	Negative	Control Corruption	Accountability
DISC → CSLI	Negative	Equality for Human Rights	Judicial System
ICON → CSLI	Negative	Improve Transparency	Legislative Conviction
EXP → CSLI	Positive	Further IT Expertise	Capacity Building
AMBG → CSLI	Negative	Clear Laws Interpretation	Justice System
PUCO → CSLI	Positive	Strengthen Confidence	Institutional Cooperation

7. Conclusions

Pakistan already has several cybersecurity regulations in place; nonetheless, the composition of those rules is generic. Therefore, cybersecurity implementation has indeed been ineffective. The government needs to make them comprehensive and continually disseminate them among all stakeholders to make them effective. Additionally, to prevent future cyberattacks, law enforcement agencies must take cybersecurity implementation more effectively and seriously. Countries in the region, such as China and India, have already implemented appropriate cybersecurity measures in response to possible threats. In contrast, Pakistan still does not have a specialized institution other than the federal investigation agency (FIA) with complete jurisdiction to monitor and cope with cyberattacks. Moreover, in the emergence of a separate agency, the government must designate one of its bodies or institutions as a leading force. This demonstrates that cybersecurity implementation is decentralized and that the government's participation in cybersecurity is negligible. People desire to breach guidelines, infringe laws and rules, or take possession of cybersecurity as well as tangible systems to acquire monetary or nonmonetary gains. Consequently, the government must work together to accurately predict cyberthreats and attacks to keep Pakistani cybersecurity from becoming a victim of unscrupulous individuals.

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Trust, Corruption, and Tax Compliance in Fragile States: On a Quest for Transforming Africa into Future Global Powerhouse

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Abstract: This study explores the complex relationship between trust, corruption, and tax compliance in fragile states. It examines factors influencing public trust in three government branches: the ruling party (a proxy for the executive), the parliament, and the local government, and examines whether trust in these arms of government impacts tax compliance. We conducted this investigation using Afrobarometer survey data from Guinea, Mali, Sudan, and Zimbabwe as case studies. The study found that restoring public trust and promoting tax compliance are tangible outcomes arising from a steadfast commitment to electoral integrity, transparency, and accountability. This interplay becomes more vital within the framework of state fragility, where institutions are highly strained. The study highlighted that the existence of rampant corruption reduces trust in the ruling party, parliament, and local government council. Furthermore, the joint interaction between corruption and lack of trust significantly undermines the willingness of taxpayers to adhere to tax administration laws. These insights emphasise that combating corruption becomes not only a governance step but also vital to state stability. Thus, African governments should prioritise electoral integrity and combat corruption through enhanced accountability to pave the way for improved governance, enhanced trust, and a more stable path toward a global powerhouse.

Keywords: Africa Agenda 2063; corruption; SDGs 2030; state fragility; tax compliance; public trust

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1. Introduction

The notion of trust, influenced by political, economic, and social factors, is a cornerstone to ensuring state legitimacy and achieving development goals (Phelan 2006; Sánchez et al. 2012; OECD 2013; Charron and Rothstein 2016; Pillay 2017; Nunkoo et al. 2018; Mansoor 2021; Voogd et al. 2021; PwC 2022; Shanka and Menebo 2022). It emerges as a powerful predictor of individual behaviour, evident in actions like tax-paying compliance and intentions (Bianco 1994; Nunkoo 2015; Shanka and Menebo 2022).

Tax constitutes a vital source of government revenue and holds a central role in countries' fiscal policies and macroeconomic stability (PwC 2021). The United Nations recognises the pivotal role of tax in achieving the Sustainable Development Goals (United Nations 2022). The African Union recognises the significance of efficient and equitable taxation systems to reduce reliance on foreign aid and promote economic self-sufficiency. This vision hinges on enhancing domestic resource compliance and combating illicit financial flows to fulfil the aspirations of the African population (PwC 2021).

Government trust, corruption, and taxation constitute well-documented areas of research (Charron and Rothstein 2016; Sánchez et al. 2012; Nkundabanyanga et al. 2017; Pillay 2017; Nunkoo et al. 2018; D'Attoma 2020; Mansoor 2021; Voogd et al. 2021; PwC 2022;

Shanka and Menebo 2022; Kogler et al. 2023). Increased tax compliance can be an outgrowth of citizens' trust in the government (Nurkholis et al. 2020). According to Nkundabanyanga et al. (2017) and Pillay (2017), tax compliance or non-compliance is influenced by factors such as government effectiveness, the transparency of the tax system, and voice and accountability. D'Attoma (2020) explored the impact of perceptions of public institutions on tax compliance in both the United States and Italy, identifying low institutional quality as a potential factor contributing to distrust and, subsequently, a decline in tax compliance. Analysing data from 14,509 economics students across 44 countries, Kogler et al. (2023) found that both trust and power are negatively related to the size of the shadow economy and the extent of corruption.

Notwithstanding the potential relationship between trust, corruption, and tax compliance, to our awareness, no study has examined this relationship and the necessary measures to transform Africa into a future global powerhouse. Firstly, trust builds a sense of partnership between taxpayers and the state, where individuals willingly contribute to state-building. Therefore, an understanding of the trust-tax compliance nexus is fundamental. Second, the association between trust and tax compliance remains particularly enigmatic in fragile states. These states face unique challenges, including weak institutions, political instability, and a higher propensity for corruption. Consequently, it is essential to scrutinise the dynamics of trust in these contexts.

This study bridges the identified gap by investigating factors influencing public trust in three government branches: the ruling party (a proxy for the executive), the parliament, and the local government, and examining whether trust in these arms of government impacts tax compliance. We conducted this investigation using Guinea, Mali, Sudan, and Zimbabwe as case studies. These countries were selected because of their high levels of fragility according to the Fragile States Index of the Fund for Peace (Messner et al. 2019). The Fragile States Index is a tool for understanding the dynamics of nations facing fragility.

In this context, state fragility refers to nations where governments struggle to provide essential public services, characterised by weak political institutions, economic decline, poverty, widespread corruption, security threats, and violent conflicts (Vallings and Moreno-Torres 2005; Ferreira 2017). In the 2019 Fragile States Index compiled by the Fund for Peace (FFP), countries such as Mali, Guinea, and Zimbabwe are among the African countries grouped under the "Alert" classification. Sudan, in the same assessment, was designated at an even more critical level, marked as "High Alert" (Messner et al. 2019). While the FFP ranked Mali as the most worsened country, closely following Libya (an African country but with no available data for our study), Zimbabwe and Guinea still hold the last ranks within the 'Alert' category despite some improvements. Sudan stands out as the sole African country grouped under 'High Alert' and has the available data for our study. The four countries are assumed to be representative of the remaining ten countries categorised under 'Alert' and 'High Alert' with available data for our study. The designation underscores the heightened degree of fragility within the socio-political and economic landscapes, as evaluated by the metrics employed by the FFP. We used data on attitudes and perceptions from the seventh round of the Afrobarometer survey, which was carried out in 2019.

This survey covers various aspects related to taxation and public trust. Our study contributes significantly by examining the complex link between government trust, corruption, and tax compliance. It integrates these factors, shedding light on their collective impact on governance, revenue, and social progress. First, it bridges insights from political science, economics, and social psychology to dissect these dynamics, enriching understanding across disciplines. Second, this study developed a model that dissects relationships between government trust, corruption perception, and tax compliance, revealing their complex interactions. Rigorous econometric analysis, utilising Afrobarometer survey data, quantifies these links, enhancing knowledge for policymaking across diverse settings. Third, this study translates theoretical insights into actionable steps to mitigate corruption, improve trust, and promote tax compliance.

2. Brief Overview of Institutional Background of the Sample Countries

This section introduces the diverse institutional backgrounds of Guinea, Mali, Sudan, and Zimbabwe, examining their constitutional frameworks, political transitions, and judicial systems. Each country presents a unique trajectory shaped by historical events, political developments, and societal factors, influencing the establishment and evolution of its governance structures. The information is sourced from (Britannica 2023a, 2023b, 2023c, 2023d).

Guinea, as a unitary republic under the 2020 constitution, elects a president as the head of state, serving a maximum of two six-year terms (Britannica 2023b). The president appoints a prime minister as the head of government, and legislators are elected to the National Assembly for unlimited five-year terms. The judiciary comprises the Supreme Court, the Court of Audit, and the lower courts, including a Constitutional Court and a High Court of Justice. After a military coup in September 2021, the 2020 constitution was suspended, and a transitional charter outlined governance until civilian rule was restored, featuring a president, prime minister, and an 81-member National Transitional Council.

In 1960, Mali adopted a constitution ensuring parliamentary democracy at independence, though its full implementation was delayed (Britannica 2023c). The country saw a democratically elected president installed on 4 September 2013, ending the interim administration. A military coup in August 2020 resulted in a government takeover by the National Committee for the Salvation of the People, leading to the creation of a transitional charter in September. This charter outlined a return to civilian rule with a transitional administration under the direction of an interim president and prime minister, with a goal of serving for no longer than 18 months. Despite a second military coup in May 2021, the existing transitional government structure was maintained. Mali has eight régions, each of which is further divided into 'cercles and arrondissements' and is under the control of a governor. The arrondissement serves as the fundamental administrative unit, typically hosting a school and a dispensary at its centre. There are numerous villages in this administrative division, each of which has an elected village council and a chief in charge. The Supreme Court, which has both judicial and administrative responsibilities, oversees the legal system.

Sudan, since independence in 1956, has experienced multiple regime changes, including military coups in 1985, 1989, and 2019 (Britannica 2023d). After the suspension of the interim constitution of 2005 in April 2019, a constitutional declaration was signed later that year, establishing a power-sharing agreement between the military and the Forces for Freedom and Change (FFC). A military general served as the initial leader of the transitional sovereignty council, which included both military and civilian members. A prime minister appointed a cabinet, and elections were expected in 2022. However, a military coup in October 2021 dissolved the Sovereignty Council. There are 18 administratively separate states in Sudan, each of which has a governor. The judicial system includes the Supreme Court, Appeals Courts, and a Constitutional Court.

Under the 2013 constitution, Zimbabwe is a unitary republic, with the president as the head of state and government, serving a maximum of two five-year terms (Britannica 2023a). Two vice presidents assist the president, and the parliament consists of the National Assembly and the Senate, with members serving five-year terms. Zimbabwe is divided into eight provinces and two metropolitan provinces, each further divided into districts. Mayors serve as council chairpersons in metropolitan provinces, while elected chairpersons lead councils in provinces. The judicial system includes the Constitutional Court, the Supreme Court, the High Court, a Labour Court, an Administrative Court, and customary law courts.

3. Trust and Theories of Taxpayer Compliance

At the heart of the complex interaction between tax compliance, and governance lies the fundamental concept of trust (D'Attoma 2020). Trust is not just a sentimental notion, but a cornerstone of effective tax administration in a democratic society. It serves as the bridge connecting taxpayers with their government, symbolising the reciprocal relationship

of rights and responsibilities. Nurturing taxpayer trust requires a multifaceted approach that extends beyond fiscal policies. A government that prioritises citizen welfare, effectively communicates public needs, and operates with transparency and accountability cultivates an environment where trust can flourish (Pillay 2017; Taylor et al. 2020). This alignment between governmental actions and citizen expectations reinforces taxpayers' trust in tax administration bodies.

In the relentless quest to formulate effective tax administration policies that not only encourage compliance but also foster taxpayer confidence, studies wrestle with the complex network of elements that drive tax evasion and promote compliant behaviours (Nkundabanyanga et al. 2017; Pillay 2017). This theoretical, policy and practical conundrum has spurred the interest of a diverse range of scholars, resulting in the formulation of several theories that elucidate the variations in taxpayer compliance and tax evasion: political legitimacy, social contract, economic deterrence, fiscal exchange, social influences, and comparative treatment.

The political legitimacy theory, standing as the first cornerstone of understanding taxpayer compliance and tax evasion, posits a profound link between taxpayers' trust in their government and tax compliance (Kirchler et al. 2008). This concept of legitimacy within the context of tax compliance extends to the conviction that tax authorities, institutions, laws, policies, and programs are appropriate and advantageous for the welfare of the community (Ali et al. 2014). The underpinning premise of this theory is that taxpayers who harbour higher levels of trust in their government are more inclined to exhibit greater tax compliance. Therefore, the foundation of compliance rests on the bedrock of trust in governance institutions.

Like the political legitimacy theory, social contact theory, which emerged in response to the challenges of legitimising government during the social upheavals of 17th and 18th century Europe (Jos 2006; Smith et al. 2009), is a significant theory in understanding the intricate relationship between public trust and tax compliance. The theory posits that individuals consent to be governed in exchange for the protection of their rights and well-being. This social contract forms the basis for the legitimacy of government authority. When applied to the context of taxation, this theory proposes that citizens are more likely to comply with tax obligations when they perceive the government as legitimate and trustworthy. A government that is perceived as transparent, fair, and responsive is more likely to garner trust from its citizens, leading to increased compliance with tax obligations.

The economic deterrence theory, the third pillar elucidating the spectrum of taxpayer behaviour, posits that the enforcement policies and actions of tax administrations discourage individuals from resorting to tax evasion (Sandmo 2005). The calculus involved in the decision-making process of compliance versus evasion revolves around an assessment of the potential benefits from compliance versus the foreseeable personal costs of non-compliance (Ali et al. 2014). This theory finds a reflection in tax administration laws that detail penalties as a deterrent strategy. The implication here is that taxpayers who perceive tax evasion as a daunting prospect are more likely to adopt a disposition of tax compliance.

Fiscal exchange theory, which constitutes the fourth paradigm relevant to tax compliance, postulates a contractual relationship between taxpayers and the government, like an exchange of taxes for public goods and services (Moore 2004; Ali et al. 2014). In essence, this theory asserts that taxpayer compliance behaviours are intrinsically tied to their perception of receiving equitable benefits from the government (Ali et al. 2014). Unlike the economic deterrence theory which is based on fear of legal consequences, the fiscal exchange theory accentuates positive benefits from compliance, leading to a higher probability of voluntary adherence (Moore 2004). At its core, fiscal exchange theory highlights the correlation between tax compliance and individuals' contentment with the quality of goods and services they receive from the government.

Social influence theory, a fifth facet in understanding taxpayer behaviours, contends that compliance attitudes and actions are shaped by the behaviours of fellow taxpayers and the prevailing social norms (Keith 1990). Consequently, social influences have the power to

alter the perceived likelihood of detection and, thereby, impact compliance choices. Those who observe peers and acquaintances adhering to tax regulations tend to follow suit, while those who perceive widespread tax evasion might be inclined toward non-compliance (Ali et al. 2014). Ali et al. (2014) highlight that individuals who perceive their fellow citizens as tax-compliant are more predisposed to uphold their tax obligations, further emphasising the role of the social context in shaping compliance attitudes.

The last but not least theory, the comparative treatment theory, posits that individuals assess how the government treats them in comparison to the treatment of other societal groups (McKerchar and Evans 2009). This assessment goes beyond merely assessing the benefits received from the state; it extends to the fairness of treatment compared to other citizens within the nation. This assessment significantly influences their perceptions of both the state and its citizens. According to this theory, individuals who perceive equitable treatment by the government and a sense of parity within their societal group are more inclined to comply with their tax obligations. The concept of a 'group' here encompasses dimensions such as wealth, education, age, religion, or ethnicity (Ali et al. 2014).

Rooted in incentives and penalties, these theories provide a nuanced view of factors that shape the choices of individuals related to tax. Fiscal exchange and comparative treatment theories, for instance, share an incentive-based foundation. The fiscal exchange highlights that taxpayers are likely to comply when they see a direct link between compliance and government benefits. Creating an environment where contributions yield tangible returns motivates participation. Similarly, the theory of comparative treatment underscores the role of equity. Individuals assess their treatment relative to others, gauging fairness. Ensuring equal treatment fosters compliance. In contrast, social influence and economic deterrence theories focus on penalties. Economic deterrence uses punitive legal measures to deter evasion. Social influence examines the dynamics of peers. Observing peers' compliance pressures conformity. Fear of non-compliance stigma deters evasion within social circles.

The political legitimacy and social contract theories emerge as a unifying force that encapsulates both the incentive and penalty dimensions of tax compliance. Trust in the government, the cornerstone of political legitimacy and social contract, acts as an overarching incentive for taxpayers to comply. When individuals trust that the government is acting in their best interest and utilising tax revenues responsibly, they are more likely to willingly contribute. A government that fosters trust while also demonstrating its commitment to enforcing tax regulations instils a sense of fairness and equity, promoting both compliance and the integrity of the tax system. To illustrate the interplay between trust, authority, and taxpayer compliance, we employ the three-dimensional figure developed by Kirchler et al. (2008), depicted in Figure 1.

The three-dimensional model offers a visual representation of the complex interplay between trust, government, and taxpayer compliance. This model offers a framework that illustrates how these elements collaboratively influence taxpayer behaviour and ultimately affect compliance outcomes.

Starting from the low trust end of the model, where both government authority and trust are weak, taxpayers are more inclined to resort to tax evasion to maximise personal gains. This leads to decreased overall tax compliance. As the model progresses along the left side of the low-trust zone, compliance begins to increase. This upward trend results from increased governmental power to conduct audits and identify non-compliance, coupled with substantial fines for deviations. This alters the incentives of taxpayers for tax evasion, as the anticipated benefits of compliance outweigh the gains from evasion. Empowering authorities to enforce penalties fosters an environment of compelled.

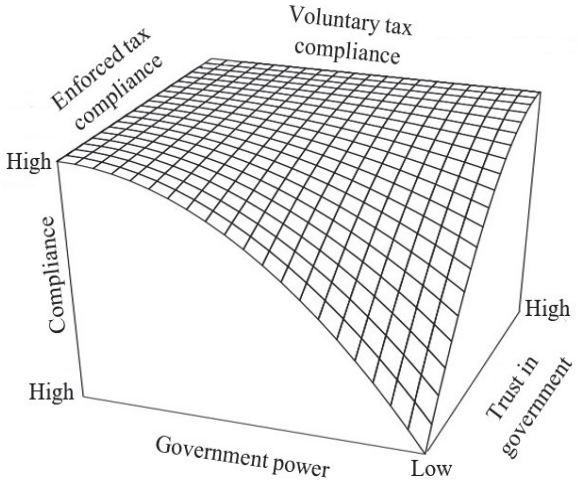

Figure 1. A framework to assess trust and taxpayer compliance. Source: Adopted from Kirchler et al. (2008), with slight modification.

Moving along the front and then the right edge of the model, in the context of limited government authority, compliance experiences an upward trend as trust deepens. Voluntary compliance significantly increases in situations with high trust levels. This phenomenon is observable when strong government authority coincides with substantial trust in authorities. However, it is important to note that while both instances achieve high compliance, a qualitative distinction arises between two types of compliance: enforced and voluntary.

The interactive dimensions of power and trust exhibit reciprocal dynamics, subtly influencing each other. Trust fluctuations gain prominence when power is constrained. In situations of imposing government authority, trust variations become less significant as authorities can enforce compliance. On the contrary, variations in government power carry more weight when trust is scarce. However, at peak trust levels, power disparities become insignificant as taxpayers willingly meet tax obligations.

Therefore, the model emphasises that increased compliance can be achieved through strategic investments in power or trust, contingent on specific circumstances. Understanding the implications of this interaction enables governments to make informed decisions that cultivate an environment fostering greater compliance, trust, and effective tax administration.

4. Materials and Methods

4.1. Source and Nature of Data

The source of data for this study is Afrobarometer survey data. Afrobarometer is a nonpartisan, pan-African study institution conducting public attitude surveys on democracy, governance, economy, and society in more than 30 African countries (Afrobarometer 2022). These surveys have been carried out at periodic intervals since 1999. The primary method involves personal interviews to gather information from individual respondents. A standardised questionnaire, containing identical or functionally equivalent items, is administered to every respondent across countries and time periods, enabling comparisons across countries and over time periods.

During the face-to-face interview, the respondent's language was used as a preferred instrumental tool to obtain information. Accordingly, the interviewer poses a series of questions and records the provided responses. This approach increases high survey response rates, minimal refusal rates, opportunities for respondents to clarify their answers, and the ability to draw inferences about public opinion by aggregating responses.

Afrobarometer's sample sizes are considered sufficient for making inferences about all voting-age citizens. The average margin of sampling error is no more than plus or minus 2.8% at a 95% confidence level for a sample size of 1200 in our case. Many scholars, including Wig and Tollefsen (2016); Ahlerup et al. (2017); Odhiambo (2019); and Djemaï and Kevane (2023), have conducted research using Afrobarometer as a primary source of data.

Understanding the association between trust, corruption, and tax compliance is possible using the Afrobarometer survey data of round 7, 2019. In 2019, Afrobarometer conducted surveys in 34 African countries. The selected countries for this study had the following number of observations: Guinea (1194), Mali (1200), Sudan (1200), and Zimbabwe (1200), with a total of 4794 observations. After cleaning the missing variables, 4545 observations were used for the analysis. We opted for Round 7 (2019) of the Afrobarometer survey data instead of Round 8 (2022) because the former incorporated the tax compliance variable, whereas the latter did not. All selected Afrobarometer country surveys are nationally representative. The surveys are administered at the individual level and the respondents are household heads.

4.2. Empirical Strategy

The empirical application of the study question to establish the effects of trust in government on tax compliance demands modelling tax compliance as a function of trust and several other covariates that may confound this relationship.

Given that the outcomes (variables) of interest are binary categories with two values (1, 0), the use of linear regression, the ordinary least square method (OLS), is not acceptable. This is because OLS assumes a linear relationship between the outcome variables and the independent variables (covariates) (Hosmer et al. 1997; Wooldridge 2010).

One of the essential assumptions in OLS is that the error term should ordinarily be distributed with an expected mean of zero and a constant variance for all observations. When the outcome variable is binary, this does not hold true (Hosmer et al. 1997; Wooldridge 2010).

When the outcome variable is a binary categorical variable with two values (1, 0), the logit or probit model is the best technique to analyse the relationship between covariates and the outcome variable while controlling for the effects of other covariates (Wooldridge 2010). The use of the logit model over the probit model is simply due to the ease with which parameter estimations can be interpreted (Hosmer et al. 1997; Faraway 2010). Therefore, this study employs a logit regression model to examine the effect of covariates over the selected outcome variables (whether an individual has trust in the ruling party or not, trust in parliament or not, and whether an individual must pay tax or not).

The odds of the occurrence of an event (whether an individual has trust in the ruling party or not, trust in parliament or not, trust in the local government or not, and whether an individual must pay tax or not in our context) are the ratio of the likelihood of the event to the likelihood of the non-occurrence of the event. If the likelihood of the occurrence of an event is p, the likelihood of the non-occurrence of an event is $1 - p$. Thus, the corresponding odd of an event is given as follows:

$$\text{Odds (occurrence of an event)} = \left(\frac{p}{1-p}\right) \tag{1}$$

Similarly, the odds of the non-occurrence of the event are also given as follows:

$$\text{Odds (non-occurrence of an event)} = 1 - \left(\frac{p}{1-p}\right) \tag{2}$$

Since a logistic model computes the likelihood of the occurrence of an event over the likelihood of the non-occurrence of an event, the effect of the covariates is generally enlightened in terms of odds. With a logistic model, the likelihood of the occurrence of an event 'p' in terms of covariates 'x' is shown relating 'p' and 'x' by the $p = \alpha_0 + \alpha_i x_i$

equation. However, this is not a good model specification. This is because extreme values of 'x' will yield values of $\alpha_0 + \alpha_i x_i$ that does not fall between 0 and 1. Thus, the logistic model is an appropriate solution to such a problem by transforming the odds using the natural logarithm (Peng and So 2002).

The log odds or the natural log odds as a linear function of the covariates, using Equations (1) and (2), the simple logistic regression mode, is given as follows:

$$\begin{aligned} Z = \quad & logit\left(TRP_{ih,j}\ or\ TPP_{ih,j}\ or\ TLG_{ih,j} = 1\middle|x_i\right) = \ln(odds) = \\ & ln\left(\frac{\left(TRP_{ih,j}\ or\ TPP_{ih,j}\ or\ TLG_{ih,j}=1\middle|x_i\right)}{\left(1-\left(TRP_{ih,j}\ or\ TPP_{ih,j}\ or\ TLG_{ih,j}=1\middle|x_i\right)\right)}\right) = \alpha_0 + \alpha_i x_i \end{aligned} \tag{3}$$

where: 'TRP' denotes trust in the ruling party; 'TPP' represents trust in parliament; 'TLG' represents trust in local government council; 'ih, j' denotes i^{th} individual in 'h' household ($ih = 1, 2, 3, \ldots, n$), who resides in country 'j'; α's are the regression coefficients of the covariates, and $\frac{\left(TRP_{ih,j}\ or\ TPP_{ih,j}\ or\ TLG_{ih,j}=1\middle|x_i\right)}{\left(1-\left(TRP_{ih,j}\ or\ TPP_{ih,j}\ or\ TLG_{ih,j}=1\middle|x_i\right)\right)}$ is the odds ratio.

Using the antilog of Equation (3), to estimate the likelihood of the occurrence of the outcome variables of interest is given as follows:

$$\begin{aligned} & Z = TRP_{ih,j}\ or\ TPP_{ih,j}\ or\ TLG_{ih,j} = \\ & \frac{\exp(\alpha_0+\alpha_1 ECS+\alpha_2 PER+\alpha_3 COR+\alpha_4 FSP+\alpha_5 FS+\alpha_6 RLE+\alpha_7 HRA+\alpha_8 CD)}{(1+\exp(\alpha_0+\alpha_1 ECS+\alpha_2 PER+\alpha_3 COR+\alpha_4 FSP+\alpha_5 FS+\alpha_6 RLE+\alpha_7 HRA+\alpha_8 CD)} \end{aligned} \tag{4}$$

Therefore, the logarithmically transformed logit model, Equation (4) can be rewritten as a linear combination of the covariates as follows:

$$\begin{aligned} & Z = \text{logit} = \ln\left(TRP_{ih,j}\ or\ TPP_{ih,j}\ or\ TLG_{ih,j} = 1\middle|x_i\right) = \alpha_0 + \alpha_1 ECS + \alpha_2 PER + \\ & \alpha_3 COR + \alpha_4 FSP + \alpha_5 FS + \alpha_6 RLE + \alpha_7 HRA + \alpha_8 CD \end{aligned} \tag{5}$$

where: $\ln\left(TRP_{ih,j}\ or\ TPP_{ih,j}\ or\ TLG_{ih,j} = 1\middle|x_i\right)$ is the log odds or logit, 'ln' is the natural logarithm, 'Z' is the likelihood of outcome variables of interest, 'x' is the covariates, 'α_0' and 'α_i' are the intercept and regression coefficients, respectively.

Similarly, to examine the determinants of whether an individual must pay a tax or must not pay a tax ($TXP_{ih,j}$) was also examined using a logit model, which is specified as follows:

$$\begin{aligned} & Z = \left(TXP_{ih,j} = 1\middle|x_i\right) = \frac{exp^{\left(TXP_{ih,j}=1|x_i\right)}}{\left(1+exp^{\left(TXP_{ih,j}=1|x_i\right)}\right)} = \beta_0 + \beta_1 ECS + \beta_2 PER + \\ & \beta_3 COR + \beta_4 FSP + \beta_5 FS + \beta_6 HHE + \beta_7 HRA + \beta_8 CD \end{aligned} \tag{6}$$

The logarithmically transformed logit model of Equation (6) can be rewritten as a linear combination of the covariates as follows:

$$\begin{aligned} & Z = logit = ln\left(TXP_{ih,j} = 1\middle|x_i\right) = \beta_0 + \beta_1 ECS + \beta_2 PER + \beta_3 COR + \beta_4 FSP + \\ & \beta_5 FS + \beta_6 RLE + \beta_7 HRA + \beta_8 CD \end{aligned} \tag{7}$$

where: $TXP_{ih,j}$ denotes whether there is a tax compliance or not, $\frac{\left(TXP_{ih,j}=1\middle|x_i\right)}{\left(1+\left(TXP_{ih,j}=1\middle|x_i\right)\right)}$ represents log odds or logit, β_0 is the intercept, and β's are the regression coefficients of the covariates.

When the value of a 'α_i' or 'β_i' is a positive, a unit change in 'x_i' is raising the odds of the occurrence of the event while controlling the other covariates. Whereas, when the value of a 'α_i' or 'β_i' is negative, the odds of the occurrence of the event decrease with a unit increase in 'x_i' while other covariates remain fixed.

Although a logistic regression model looks similar to OLS, however, the underlying binomial distribution and parameters (α_0, α_i, β_0, β_i) cannot be computed in the same way

as for OLS. As an alternative, the parameters are generally computed using the Maximum Likelihood Estimation (MLE) technique (Menard 2011). The MLE will provide values of parameters (α_0, α_i, β_0, β_i), which maximises the probability of obtaining the data.

The MLE computes the likelihood of observing the data, with the unknown parameters (α_0, α_i, β_0, β_i). A "likelihood" is a probability that the observed values of the outcome variables may be estimated from the observed values of the covariates. The log-likelihood varies from 0 to $-\infty$. Suppose in our sampling, each respondent has the same probability 'p', that an event occurs. For each individual in our sample of size ('n'), $TRP_{ih,j}$ *or* $TPP_{ih,j}$ *or* $TLG_{ih,j}$ *or* $TXP_{ih,j} = 1 \left| x_I \right.$ shows that the occurrence of an event for the i^{th} individual in 'h' household ($ih = 1, 2, 3, \ldots, n$), who resides in country 'j'; otherwise, $TRP_{ih,j}$ *or* $TPP_{ih,j}$ *or* $TLG_{ih,j}$*r* $TXP_{ih,j} = 0 \left| x_I \right.$. The observed data are $TRP_{ih,j}$, $TPP_{ih,j}$, & $TLG_{ih,j}$, $TXP_{ih,j}$ (dependent variables) and ECS, PER, COR, FSP, FS, RLE, HRA, & CD (covariates). Thus, using a natural logarithm, the MLE is given as follows:

$$\log(MLE) = \sum_{i=1}^{n} Y_i \log[\mathrm{p(y/x)}] + \left(n - \sum_{i=1}^{n} Y_i\right) \log[1 - p(y/x)] \quad (8)$$

The covariates used in this study are abbreviated as follows: the electoral commission (ECS), level of performance (PER), levels of corruption (COR), freedom of speech (FSP), respondents levels of education (RLE), household food insecurity (FS), household residential area (HRA: rural vs. urban), and country dummies (CD) (Guinea = 0 (reference category), Mali, Sudan, and Zimbabwe).

5. Descriptive Statistics

5.1. Trust in Various Branches of Government

Table 1 presents a comparative analysis of institutional trust in the sample countries. Data reveal differences in citizens' perceptions of electoral commissions, parliaments, local government, and ruling parties, which are key indicators of political stability and the effectiveness of the governance of a nation. Trust in these institutions varies widely among the countries surveyed.

Table 1. Trust in various branches of government across countries.

Countries	Branches of Government	Not at All	Just a Little	Somewhat	A Lot
Guinea	Electoral commission trust	42%	20%	16%	22%
	Parliament trust	32%	28%	16%	26%
	Ruling party trust	39%	22%	14%	26%
	Local government trust	26%	30%	15%	29%
Mali	Electoral commission trust	20%	25%	22%	32%
	Parliament trust	23%	28%	22%	27%
	Ruling party trust	19%	31%	24%	26%
	Local government trust	18%	25%	21%	36%
Sudan	Electoral commission trust	55%	22%	15%	8%
	Parliament trust	49%	25%	17%	9%
	Ruling party trust	54%	21%	15%	10%
	Local government trust	46%	29%	16%	9%
Zimbabwe	Electoral commission trust	24%	21%	27%	28%
	Parliament trust	17%	24%	30%	29%
	Ruling party trust	21%	19%	24%	36%
	Local government trust	21%	25%	28%	26%

Source: Own calculations using round 7 Afro-barometer survey data, 2019.

Table 1 highlights that 42% of citizens in Guinea express complete distrust in the electoral commission. Similar dynamics are observed for distrust in the ruling party and parliament. Such widespread distrust suggests a fractured relationship between the government and its citizens, which can lead to disengagement from the political

process, and even social unrest. A lack of confidence in these institutions undermines their legitimacy and their ability to fulfil their roles in upholding democratic processes and ensuring fair representation.

Sudan shows extreme distrust in the electoral commission (55%), in the ruling party (54%), and in the parliament (49%), signifying potential electoral fragility and instability, hinting at a severe erosion of public trust in the mechanisms responsible for the country's political decision-making. This undermines the credibility of elections and electoral outcomes. The risk of protests, conflicts, or even political upheaval is increased when citizens perceive that their voices are not being heard or represented by these institutions.

In Mali, the highest trust is placed in the local government at 36%, in the electoral commission (32%), and in the parliament (27%), indicating a moderate level of confidence. This situation implies that while certain aspects of governance may be functioning relatively well, there are areas where improvements are needed to ensure a stable political environment. On the contrary, Zimbabwe has better levels of trust in its government institutions. Citizens in Zimbabwe appear to have relatively more trust in these institutions, particularly the parliament and ruling party.

Diving deep into decentralised governance, the findings provide valuable insights into the varying levels of trust in local government councils across these four countries. Mali stands out with the highest level of trust in its local government, while Sudan exhibits the lowest level of trust, with a significant percentage of respondents expressing "Not at all" trust. Only 9% of the Sudanese respondents place a similar degree of trust in their local government council. On the opposite end of the spectrum, the figure jumps significantly to 46% among Sudanese respondents, demonstrating a profound lack of trust in the local government institution.

5.2. Level of Corruption across Countries

Table 2 illustrates the varying perceptions of corruption levels between the sample countries. In general, Sudan and Guinea have the highest proportion of respondents, indicating that corruption has increased a lot. Sudan stands out, with 70% of respondents reporting a lot of increase in corruption. This signifies a deep-seated perception that corruption is becoming more widespread in these countries.

Table 2. Perceived level of corruption in different countries.

Level of Corruption	Guinea	Mali	Sudan	Zimbabwe
Increased a lot	51%	45%	70%	42%
Increased somewhat	14%	16%	18%	23%
Stayed the same	11%	12%	5%	23%
Decreased somewhat	18%	21%	7%	10%
Decreased a lot	6%	6%	2%	2%

Source: Own calculations using round 7 Afro-barometer survey data, 2019.

For all the countries, the lowest proportion of respondents, ranging from 2% to 6%, feel that corruption has decreased significantly, indicating a relatively smaller perception of a substantial reduction in corruption.

While the analysis is generalised, it might be interesting to explore whether there are regional patterns in the perceived changes in corruption. For instance, if a significant proportion of respondents from a particular province within a country feel that corruption has increased, it could indicate specific issues or dynamics within that province.

5.3. Handling Corruption in Government

Figure 2 illustrates the prevailing perception that corruption is not adequately addressed in these countries. Most respondents indicate that corruption is being tackled either "Very Badly" or "Fairly Badly." Comparatively, the perceptions of practical anti-corruption efforts ("Fairly Well" and "Very Well") are notably lower.

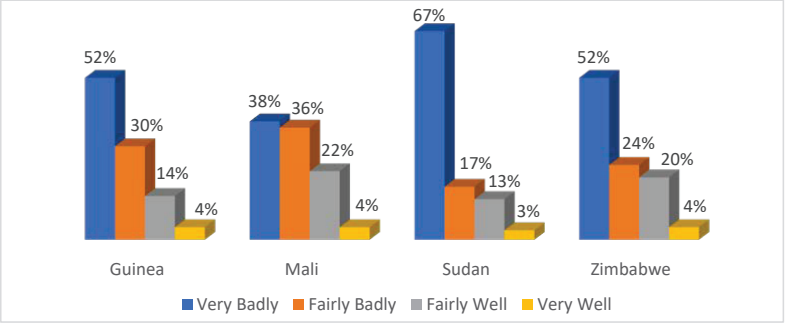

Figure 2. Handling of fighting corruption. Source: Own construction using round 7 Afrobarometer survey data, 2019.

More than half of the respondents in Guinea, Zimbabwe, and Sudan believe corruption is being addressed "Very Badly". This attitude is particularly strong in Sudan, where 67% of the respondents share this view. Guinea and Zimbabwe closely follow with a percentage of 52%. As highlighted in Figure 2, Mali follows this category, with 38%. Across the sample countries, very few respondents feel that corruption is being handled "Very Well" with proportions between 3% and 4% in this category, indicating a limited perception of practical anti-corruption efforts.

5.4. Reporting the Acts of Corruption and Its Knock-On Effects

The results revealed in Figure 3 regarding reporting acts of corruption across the surveyed countries illustrate a crucial dimension of state fragility—the erosion of transparency, accountability, and civic engagement. Statistically, high percentages of respondents from all sample countries who fear retaliation for reporting corruption, underscore the delicate balance between the willingness of citizens to report incidents of corruption and the potential repercussions they perceive.

Figure 3. Report corruption and its knock-on effects. Source: Own construction using round 7 Afrobarometer survey data, 2019.

For example, Zimbabwe has the highest percentage (73%) of respondents who believe there is a risk of retaliation for reporting acts of corruption. Sudan follows closely, with 72% of the respondents expressing the same concern. These responses can be influenced by the level of democracy and freedom of speech and media within each country. Political environments, including the presence of censorship or restrictions, can also play a role in shaping people's perceptions of reporting and retaliation.

The data presented in Figure 3 offers a valuable lens through which to examine the multifaceted nature of state fragility. Fear of retaliation for reporting corruption is not

merely an isolated concern; it is intertwined with broader governance challenges, media freedom, and the state's relationship with its citizens.

5.5. Attitudes toward Taxes in Different Countries

Table 3 presents the results of a survey on attitudes toward taxes. Most of the respondents in all countries agree that people must pay taxes. Mali stands out, with 52% of respondents strongly agreeing that people must pay taxes, followed by Zimbabwe (35%) and Guinea (23%). Zimbabwe has the highest percentage of respondents who agree that people must pay taxes (50%), followed by Sudan (48%).

Table 3. Attitudes toward taxes in different countries.

Must Pay Tax	Guinea	Mali	Sudan	Zimbabwe
Strongly disagree	17%	5%	11%	3%
Disagree	20%	8%	19%	8%
Neither agree nor disagree	5%	3%	6%	4%
Agree	35%	32%	48%	50%
Strongly agree	23%	52%	16%	35%

Source: Own calculations using round 7 Afro-barometer survey data, 2019.

As indicated in Table 3, in general, the percentage of respondents who strongly disagree or disagree with the statement 'people must pay taxes' is relatively low in all countries. There could be two primary reasons for this phenomenon. First, it suggests that paying taxes is widely accepted as a civic duty. Second, respondents may fear legal penalties if they do not pay taxes.

6. Main Findings

The main findings are presented in two tables. The first table, Table 4, demonstrates the effects of government trust, government performance, and corruption on tax compliance. It also presents the effects of government performance and corruption on trust in the branches of government. The second table, Table 5, presents the effects of other control covariates on government trust and tax compliance.

Table 4 offers an analysis of the factors that influence public trust in government institutions, shedding light on how this trust subsequently impacts tax compliance. The presentation has been confined to the core variables of interest, while the additional control covariates are presented in Table 5. Given that all models are derived using the binary logistic regression technique, the coefficients provide only valuable information on the significance and direction of relationships. To facilitate a probabilistic interpretation, marginal effects have been calculated for all coefficients. The marginal effect for each variable is demonstrated next to the coefficients. When discussing the significance and direction of relationships, we refer to the coefficients. When examining the magnitude of relationships, we refer to these marginal effects.

Table 4 illustrates a direct and significant association between trust in the ruling party and taxpayers' compliance with tax administration and law. The marginal effects show that, compared to the respondents who did not have trust in the ruling party, those who had trust in the ruling party increase the probability of paying a tax compliance by 4.6% points (marginal effects), holding other covariates in the model constant.

Table 4. Logistic and marginal effects (mfx) estimates: trust, corruption, and tax compliance.

Covariates	Ruling Party Trust	mfx	Parliament Trust	mfx	Local Council Trust	Mfx	Must Pay Tax	mfx
Government Trust (GT) (Ref. = None)								
Ruling party trust							0.062 ***	0.046 **
							(0.023)	(0.020)
Parliament trust							−0.022	−0.017
							(0.023)	(0.020)
Local council trust							−0.007	−0.006
							(0.022)	(0.020)
Trust in Electoral Commission (ECS) (Ref. = None)								
Little	0.376 ***	0.206 ***	0.350 ***	0.206***	0.304 ***	0.187 ***	0.029	0.022
	(0.018)	(0.011)	(0.019)	(0.012)	(0.019)	(0.013)	(0.021)	(0.019)
Some	0.367 ***	0.217 ***	0.356 ***	0.230***	0.331 ***	0.235 ***	0.044 **	0.036 *
	(0.018)	(0.013)	(0.018)	(0.014)	(0.018)	(0.015)	(0.021)	(0.020)
A lot	0.362 ***	0.243 ***	0.358 ***	0.258***	0.309 ***	0.226 ***	0.067 ***	0.065 ***
	(0.018)	(0.015)	(0.018)	(0.014)	(0.018)	(0.015)	(0.021)	(0.020)
Performance of a Government (PER) (Ref. = Bad performance)								
President performance	0.100 ***	0.076 ***	0.052 ***	0.043 ***	0.001	−0.002	0.012	0.014
	(0.008)	(0.006)	(0.008)	(0.006)	(0.008)	(0.006)	(0.009)	(0.009)
Mayor performance	0.009 *	0.008 *	0.010 *	0.007	0.029 ***	0.026 ***	0.001	0.002
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
Local council performance	0.007	0.009	0.042 ***	0.038 ***	0.080 ***	0.069 ***	0.007	0.010
	(0.008)	(0.007)	(0.008)	(0.007)	(0.009)	(0.007)	(0.009)	(0.009)
Level of Corruption (COR) (Ref. = None)								
Least	−0.070 ***	−0.053	−0.064 **	−0.054	−0.053 **	−0.022	−0.018	−0.035
	(0.026)	(0.047)	(0.026)	(0.044)	(0.025)	(0.044)	(0.036)	(0.044)
Less	−0.071 ***	−0.071 *	−0.059 **	−0.067 *	−0.053 **	−0.053	−0.066 **	−0.077 **
	(0.022)	(0.037)	(0.023)	(0.036)	(0.023)	(0.035)	(0.029)	(0.035)
Some	−0.082 ***	−0.098 ***	−0.061 ***	−0.074 **	−0.056 **	−0.069 **	−0.079 ***	−0.088 **
	(0.023)	(0.037)	(0.023)	(0.036)	(0.023)	(0.035)	(0.029)	(0.035)
High	−0.058 **	−0.070 *	−0.024	−0.027	−0.052 **	−0.069 **	−0.062 **	−0.071 **
	(0.023)	(0.037)	(0.023)	(0.036)	(0.023)	(0.034)	(0.028)	(0.035)
Highest	−0.137 ***	−0.130 ***	−0.143 ***	−0.134 ***	−0.101 ***	−0.100 ***	−0.040	−0.053
	(0.023)	(0.035)	(0.023)	(0.034)	(0.022)	(0.033)	(0.027)	(0.034)
Individual level variables	Yes		Yes		Yes		Yes	
Household level variables	Yes		Yes		Yes		Yes	
Country Dummies	Yes		Yes		Yes		Yes	
Observations	4545		4545		4545		4545	

Notes: Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Source: Own calculations using round 7 Afro-barometer survey data, 2019. Trust is a discrete variable indicating whether a respondent trusts the ruling party, parliament, or local government. Performance is discrete, indicating the respondent's evaluation of the president, mayor, or local council's performance. Individual control variables include freedom of speech and levels of education. Household controls incorporate household food insecurity and household residential area. Country dummies are Guinea (reference category), Mali, Sudan, and Zimbabwe. mfx (average marginal effects) denotes marginal effects.

Trust in the electoral commission plays a pivotal role in increasing trust in the branches of government. The marginal effects in Table 4 demonstrate that the expected probability of trust in the ruling party increases by 20.6% points for respondents who have little trust in the electoral commission than those who do not have trust (the reference category) while with other covariates in the model are held constant. This trend becomes more pronounced as trust in the ruling party grows by 21.7% points for some trust and 24.3% points for a lot of trust in the electoral commission compared to the reference category. Similarly, a marginal increase in a little trust in the electoral commission corresponds to a 20.6% points increase in trust in the parliament. This effect has increased as the trust in the parliament increases by 23.0% points for some trust and 25.8% points for a lot of trust in the electoral commission while holding other covariates in the model. Furthermore, in contrast, the

expected probability of trust in the local government council is higher by 18.7% points for those who have trust just a little witness than those who do not have trust in the electoral commission while a lot of trust results in a 22.6% points increase in local council trust, while holding other covariates in the model constant.

Table 5. Logistic and marginal effects (mfx) estimates: Effects of other control variables on government trust and tax compliance.

Covariates	Ruling Party Trust	mfx	Parliament Trust	mfx	Local Council Trust	mfx	Must Pay Tax	mfx
Freedom of Speech (FSP) (Ref. = None)								
Not very free	0.029	0.022	−0.003	−0.005	0.020	0.015	0.059 ***	0.059 ***
	(0.019)	(0.015)	(0.018)	(0.016)	(0.019)	(0.016)	(0.021)	(0.020)
Free	0.046 ***	0.039 ***	−0.013	−0.015	0.021	0.019	0.041 **	0.043 **
	(0.017)	(0.015)	(0.017)	(0.015)	(0.018)	(0.016)	(0.020)	(0.019)
Very free	0.045 ***	0.044 ***	−0.014	−0.012	0.014	0.011	0.069 ***	0.070 ***
	(0.017)	(0.015)	(0.017)	(0.016)	(0.018)	(0.016)	(0.021)	(0.020)
Household Food Security (FS) (Ref. = Secure)								
Seldom food insecure	0.012	0.018	0.035 **	0.040 **	0.017	0.016	0.006	0.004
	(0.014)	(0.016)	(0.015)	(0.017)	(0.015)	(0.017)	(0.018)	(0.019)
Several times food insecure	0.009	0.015	0.040 ***	0.039 ***	0.038 ***	0.030 **	−0.034 **	−0.032 *
	(0.013)	(0.013)	(0.014)	(0.013)	(0.014)	(0.014)	(0.017)	(0.016)
Many times food insecure	−0.026	−0.012	−0.028	−0.017	−0.037 **	−0.026 *	−0.032	−0.029
	(0.017)	(0.014)	(0.017)	(0.015)	(0.017)	(0.014)	(0.021)	(0.019)
Always food insecure	0.004	0.005	0.046	0.042	−0.022	−0.018	0.017	0.012
	(0.031)	(0.025)	(0.030)	(0.027)	(0.033)	(0.027)	(0.038)	(0.035)
Respondents Level of Education (RLE) (Ref. = None)								
Primary level	−0.024	−0.017	−0.019	0.005	−0.003	0.005	0.031 *	0.029 *
	(0.015)	(0.014)	(0.015)	(0.015)	(0.015)	(0.015)	(0.018)	(0.017)
Secondary level	−0.028 *	−0.008	−0.009	−0.026 *	−0.030 *	0.026	0.037 *	0.034 *
	(0.016)	(0.016)	(0.016)	(0.016)	(0.017)	(0.019)	(0.019)	(0.019)
Higher level	−0.079 ***	−0.002	−0.008	0.026	0.021	0.026	0.073 ***	0.071 ***
	(0.021)	(0.018)	(0.021)	(0.019)	(0.020)	(0.019)	(0.023)	(0.024)
Household Residence (HRA) (Ref. = Rural)								
Urban area	−0.006	−0.007	−0.033 ***	−0.030 ***	−0.038 ***	−0.035 ***	0.054 ***	0.050 ***
	(0.012)	(0.011)	(0.013)	(0.011)	(0.013)	(0.011)	(0.014)	(0.015)
Country Dummy (CD) (Ref. = Guinea)								
Mali	0.069 ***	0.063 ***	0.023	0.026	−0.033	−0.015	0.267 ***	0.229 ***
	(0.019)	(0.016)	(0.020)	(0.018)	(0.020)	(0.017)	(0.023)	(0.022)
Sudan	0.107 ***	0.068 ***	0.001	−0.012	−0.012	−0.015	0.246 ***	0.200 ***
	(0.017)	(0.013)	(0.017)	(0.014)	(0.016)	(0.015)	(0.020)	(0.017)
Zimbabwe	0.084 ***	0.066 ***	0.015	0.012	−0.001	0.002	0.210 ***	0.165 ***
	(0.017)	(0.016)	(0.017)	(0.016)	(0.017)	(0.017)	(0.022)	(0.019)
Observations	4545		4545		4545		4545	

Notes: Standard errors in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Source: Own calculations using round 7 Afro-barometer survey data, 2019. mfx (average marginal effects) denotes marginal effects.

Similarly, a high level of trust in the electoral commission improves the willingness to adhere to tax administration laws by 6.5% points. This implies that a significant level of trust in the electoral commission while keeping other covariates constant, is associated with 6.5% points higher than the expected probability of taxpayers complying with tax laws. These results indicate that trust in both the ruling party and the electoral commission leads to a greater willingness among taxpayers to obey tax administration laws.

The regression results demonstrate the direct and significant relationship between government performance and public trust. The marginal effects indicate that, compared to the respondents who do not observe a positive performance by the president, those who perceive the president's performance lead to a 7.6% points increase in the probability of trusting the presidential office, with other covariates in the model held constant. Simi-

larly, this increase in perception translates to a 4.3% points increase in trust towards the parliament. The perception of effective performance in the mayor positively impacts trust in both the ruling party and the local government council. The perception that the local government council performs well contributes to increased trust in both the council itself and the parliament. These results highlight the crucial impact of government performance in developing public trust in various institutions, illustrating the interrelated nature of performance and trust (Table 4).

Furthermore, conversely, the results demonstrate the inverse and significant relationship between corruption levels and public trust. The marginal effects reveal that, even when people perceive a lower level of corruption, trust in the ruling party is reduced by 7.1% points, and trust in the parliament is reduced by 6.7% points, in comparison to respondents who perceive there is no corruption. As the perception of corruption escalates to the highest level, the decline in trust becomes more apparent. This is evident in the marked decreases of 13% points in trust towards the ruling party, 13.4% points in trust towards the parliament, and 10% points in trust placed in the local council. The finding highlights the significant link between perceptions of corruption and the decline in public trust. In addition, the results indicate that there is an inverse and significant relationship between corruption and tax compliance. The estimates of marginal effects illustrate that, in comparison to respondents whose perceived corruption is none, those with the perception of the low level of corruption correspond to a reduction of 7.7% points in the willingness to pay taxes. This reduction in taxpayer compliance intensifies as corruption perceptions escalate, with reductions of 8.8% points for the same level of corruption, and 7.1% points for the highest level of corruption, keeping all other covariates in the model constant. This trend underscores the impact of perceived corruption in shaping taxpayer compliance behaviour (Table 4).

Table 5 presents the direct and significant association between freedom of speech and trust in government institutions. The marginal effects reveal that, in contrast to those who perceive the absence of freedom of speech, those who perceive they have freedom of speech increase trust in the ruling party by 3.9% points, holding other covariates in the model constant. This increase in trust increases to 4.4% points as the level of freedom of speech intensifies from free to very free.

An individual who has freedom of speech is willing to comply with tax obligations. As demonstrated in the marginal effects, compared to those who believe they do not have freedom of speech at all, those who assume they are 'not very free' leads to a 5.9% points increase in their willingness to pay taxes, 4.3% points for 'free', and 7% points for 'very free'. This means that, even in the context of some freedom of expression, individuals assume their obligation to pay tax. This finding underscores the interconnectedness between freedom of speech, trust in government, and taxpayer behaviour, illuminating how social factors play a pivotal role in shaping governance and citizen participation.

The regression results elucidate the impact of food insecurity patterns on households' trust in their local government. The marginal effect, with other covariates held constant, indicates that a shift in food insecurity among households from 'sometimes' to 'many times' results in a change from 3% points increase in trust to 2.6% points decrease in trust in the local government, with 'food secure' as the reference. This implies that addressing food insecurity issues could be a crucial factor in rebuilding trust in local government institutions.

The findings of this study indicate that there is an inverse relationship between food insecurity and tax compliance. Households experiencing several times food insecurity reduce their tax compliance by 3.2% points. Households often food insecure negatively affects trust in the local government, which in turn has an impact on tax compliance. In other words, food insecurity not only affects households' trust in political institutions but also influences their willingness to adhere to tax regulations. Similarly, the result of the regression analysis indicates that there is an inverse and significant relationship between education and trust but a direct and significant association between education and tax compliance. The levels of education of the respondents also play an important role. As

stipulated in the marginal effects, those with secondary education tend to have lower levels of trust in the ruling party and local government but display a greater willingness to comply with tax administration laws. As the level of education increases from secondary to higher education, the willingness to comply with tax administration laws increases from 3.4% to 7.1% points. This suggests that education influences political trust and tax compliance behaviour, with more highly educated individuals being less trusting of the government but more inclined to follow tax regulations. It also implies that educated individuals, equipped with an understanding of the long-term benefits of tax contributions, are more inclined to comply with tax laws.

Furthermore, the results of this study show that, compared to residents of rural areas, residents of urban areas lack trust in their parliament and local government council, with compliance rates lower by 3% points and 3.5% points, respectively. In contrast, urban residents comply with tax administration laws by 5% points when rural residents are taken as the reference category. Similarly, the geographical nuances had also a positive and significant effect on tax willingness to pay. Within our sample of fragile states, Mali, Sudan, and Zimbabwe demonstrate a stronger sentiment that citizens should bear the responsibility of paying taxes compared to Guinea, a reference category.

7. Discussion

In this study, our investigation has focused on unveiling the complex links between government trust, corruption tax compliance in fragile states. The findings underscore the importance of electoral integrity in enhancing trust in the ruling party and parliament and, in turn, taxpayer compliance, particularly in fragile states. Particularly vital for fragile states, Norris (2011) accentuates the need for vigilant measures against biases and irregularities that can worsen fragility and undermine the integrity of the electoral system. The Transparency International (2020) Global Corruption Barometer reinforces the call for transparent and non-partisan elections (Transparency International 2020). These vulnerabilities can erode trust and worsen fragility, underscoring the immediate need for transparent and non-partisan electoral processes to boost legitimacy, taxpayer compliance, and governance stability.

On the flip side, our results illuminate the impact of corruption on public trust. In countries, where governance structures are already weak, high levels of corruption wield the power to rapidly erode the trust citizens bestow upon their government. Countries with higher levels of perceived corruption tend to have lower levels of trust in their government institutions (Vallings and Moreno-Torres 2005; Ferreira 2017).

Our findings present a case for the differential impacts of trust in the ruling party on tax mobilisation. In states marked by fragility, where governance structures are prone to disruption (Messner et al. 2019), the distinct effects of trust in the ruling party on tax mobilisation become even more pronounced. The inherent vulnerability of governance structures in these states elevates the role of trust in the ruling party as a stabilising factor.

The joint interaction between corruption and lack of trust significantly undermines taxpayer willingness to adhere to tax administration laws. This highlights the impact of corruption in exacerbating the effects of reduced trust on the compliance of taxpayers. The substantial significance of the interaction term, coupled with its negative coefficient, provides empirical evidence for the substantial and negative influence of corruption on tax compliance, especially where public trust in the government is weak. These findings support the notion that countries characterised by high corruption levels face heightened susceptibility to tax evasion. This suggests a nuanced relationship in which the impact of reduced trust on tax compliance is contingent on the prevailing level of corruption. Particularly in nations grappling with high corruption rates, the impact of trust deficiency on tax compliance is expected to be more pronounced. Therefore, it can be inferred that the lack of trust will have a more pronounced effect on tax compliance in countries plagued by rampant corruption.

The direct relationship between freedom of speech and trust in the ruling party, emphasised by our study, gains greater significance. In countries, where instability and political constraints often curtail open discourse (Messner et al. 2019), the connection between freedom of speech and trust becomes a potent tool for rebuilding resilient democratic governance. The undemocratic nature of the state intensifies fears of reprisals for exposing corruption, as seen in Figure 3. The lack of trust in ruling parties, evident in Table 5, highlights the urgency of fostering an environment that champions freedom of speech. Ensuring this fundamental right is pivotal to enhancing transparency and cultivating public trust in governance. Warren (2017) underscores this nexus between freedom of speech, trust, and governance, affirming that open and inclusive political climates boost citizens' trust, with freedom of speech catalysing transparency and accountability. The Reporters Without Borders World Press Freedom Index ranks Guinea (85), Mali (113), Zimbabwe (126), and Sudan (148) according to freedom of speech (RSF 2023). This aligns with our argument on the positive link between freedom of speech and trust in the ruling party.

The findings of this study provide evidence of a complex relationship between education, political trust, and tax compliance behaviour. While it is initially surprising to note a negative correlation between education and trust in government, a closer examination of the data reveals an interesting finding. We can argue that as individuals become more educated, they become better informed about government activities and policies and, in some cases, result in lower trust. However, this scepticism can be seen as a positive outcome, as educated citizens are more likely to hold their government accountable for its actions, fostering a healthy democracy. The study found that more highly educated individuals are more willing to comply with tax administration laws. This suggests that despite their decreased trust in government, educated individuals still recognise the importance of tax compliance as a means of maintaining essential public services.

The results of this study indicate that, in comparison to residents of rural areas, those in urban areas exhibit lower trust levels in their parliament and local government council but demonstrate compliance with tax administration laws. The observed difference between urban and rural residents in trust toward parliament and local government councils could be attributed to bureaucratic inefficiencies, corruption concerns, or a lack of responsiveness in urban areas. McKay et al. (2023) found similar results and argued that at low levels of development, higher levels of trust are found among rural populations compared to those residing in urban areas. Moreover, unlike rural residents who have direct personal connections with their representatives, urban residents lack these connections with their representatives in parliament and local councils, hindering the development of a greater sense of trust. In contrast, tax administration laws are enforced more rigorously in urban settings compared to rural areas due to the concentration of businesses and financial institutions in urban settings. Like educated individuals, urban residents may have a clearer understanding of the direct and indirect benefits they receive from taxation, including improved public services.

Lack of public trust, corruption, and tax eviction presents formidable obstacles to Africa's trajectory as a future global powerhouse. Restoring trust and mitigating corruption are essential prerequisites for attracting investments and nurturing economic growth, integral elements of Africa's aspiration to assume global powerhouse. Robust tax revenue is imperative for investment in critical sectors such as education and healthcare, which are crucial for human advancement. Effective institutions are essential to address the build public trust in government and promoting transparent processes and accountability mechanisms. This intricate and multifaceted process demands transparent communication about the benefits of tax compliance and tangible enhancements in public services. As trust is restored, citizens' adherence to tax law is expected to increase, generating income for critical services, and transforming Africa into a worldwide powerhouse.

8. Conclusions and Policy Implication

The pursuit of achieving the aspirations outlined in the Africa Agenda 2063 and fostering effective governance faces a critical challenge for African countries. Within this challenge, building trust and combating corruption emerges as a pivotal remedy. Recognising that restoring trust in government and fighting corruption surpasses mere legal battles demands a profound change in values, practices, and attitudes. Building public trust and promoting tax compliance result from a dedicated commitment to integrity, transparency, and accountability.

The findings of this study underscore the crucial role that trust, and perceptions of corruption play in shaping public opinions about governmental institutions. This intricate interplay takes on even greater importance in the context of state fragility, where institutions are already under strain. Corruption's erosion of trust holds the potential to further diminish revenue generation, as citizens may be less inclined to contribute taxes when they lack confidence in compromised governance structures. Conversely, restoring trust through transparent electoral processes and robust anti-corruption measures becomes even more imperative. Citizens are more likely to cooperate when they have trust in the fairness and efficacy of government fiscal policies. Ultimately, this dynamic highlights the complex links between trust, corruption, and tax mobilisation within the broader framework of governance and public administration.

Our analysis demonstrates that corruption functions as a corrosive instrument. However, the destructive impacts of corruption go beyond governmental entities; they intertwine with the fragility of these states, further complicating their path to stability. Thus, the fight against corruption becomes not only a crucial governance step but also a lifeline for the stability of fragile states. It stands as an indispensable prerequisite for constructing a resilient governance framework that not only commands trust and encourages cooperation but also contributes to overall state stability.

As nations confront corruption, they are not merely combating an abstract concept; they are shaping the bedrock of governance and societal advancement even within precarious circumstances. This multifaceted struggle demands nurturing a cultural shift towards ethical conduct, transparency, and collective responsibility. The trajectory of trust and compliance hinges on the sincerity of these efforts. By pursuing anti-corruption measures and embracing open dialogues with citizens, governments can cultivate an environment where trust is not a fleeting sentiment but a strong and enduring cornerstone for socioeconomic transformation.

For Africa to realise its aspirations of becoming a future global powerhouse, it is imperative to address the intertwined challenges of corruption, government distrust, and state fragility. These issues not only undermine the foundations of effective governance and stability but also hinder economic growth and sustainable development. Without tackling these fundamental obstacles, Africa's journey toward global prominence remains constrained, highlighting the pressing need for wide-ranging efforts to foster transparency, accountability, and resilient governance structures across the continent.

Although economic deterrence, fiscal exchange, and comparative treatment theories are also relevant, the findings of this study fit the theories of political legitimacy, social contract, and social effects. The findings show the relationship between election integrity and trust in government, as well as the influence of political legitimacy. Credible elections strengthen the legitimacy of the government by instilling confidence and encouraging tax compliance. The emphasis on government authority and public trust mirrors insights on eroding public trust due to corruption. The study also aligns with the social influence theory, connecting food security, education, and trust. Combating food insecurity has an influence on trust, mirroring how socio-economic factors shape trust in government.

The analysis presented in the discussion section underscores several key recommendations for addressing the intricate challenges facing Africa's governance and development:

- Given the critical role of transparent and non-partisan elections in building trust and legitimacy, African nations should prioritise electoral integrity. Implementing

measures to ensure fair, credible, and accountable electoral processes can help restore citizen confidence in governmental institutions.
- To counteract the pervasive issue of corruption, African governments must strengthen institutional capacity and resilience, and implement robust anti-corruption measures. Transparent governance mechanisms, rigorous oversight, and improved accountability are crucial to curb the corrosive effects of corruption on trust and stability.
- Fostering an environment that champions freedom of speech is paramount. Governments should actively support open discourse, protect whistleblowers, and guarantee press freedom. This will not only rebuild trust but also promote transparency and accountability.
- Recognising the deep impact of food security on trust, African governments must prioritise measures to ensure the basic needs of citizens are met. Wide-ranging social protection strategies can restore the social contract and demonstrate commitment to the well-being of citizens, thereby improving tax compliance.
- Successfully addressing corruption and restoring government trust requires a sustained and long-term commitment. African leaders should prioritise these issues on national agendas, supported by concrete policy actions, transparent governance, and the participation of citizens and civil society.

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The Challenges of Artificial Intelligence in Public Administration in the Framework of Smart Cities: Reflections and Legal Issues

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Abstract: In the last decade, artificial intelligence has generated several challenges in societies, with a special focus on public administration. Through the development of this literature review, we intend to underline the challenges that this has caused in the realm of public affairs, especially in terms of the smart cities framework, considering the legal perspective that is intrinsically associated with it. In this way, we based our research on a wide range of articles, from which we considered those with the greatest relevance and the highest number of citations in order to substantiate this theme in a more precise way. Finally, we present a set of conclusions, as well as opportunities for future investigations.

Keywords: smart city; public administration; administrative law; artificial intelligence

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1. Introduction

According to some data made available by the United Nations Department of Economic and Social Affairs (2022) on global population growth, it is expected to be exponential, reaching the barrier of 9.7 billion in 2050. This high increase will imply enormous challenges for both cities and public administration as a whole, not only due to the level of their growth but also the performance, competitiveness, and livelihoods of citizens (McKinsey & Company 2013). In fact, in Jacobsen's (2019) words, in an essay, the different public policies should consider how we are committing to guarantee a better future.

Thus, in this article, we intend, through a careful literature review (from which we considered the most recent works in the area in question, as well as works with a high number of citations), to make an objective approach to the challenges that artificial intelligence may generate at the level of public administration, more specifically, in the smart cities framework. Thus, and through the literature review that was carried out, we were able to draw a set of conclusions both in the area of administration and in the legal part that covers it.

In addition, this analysis also allowed us to outline some windows for future research of enormous relevance in the current panorama of public administration, always focusing on the challenges caused by these transformations.

1.1. The Current and Demanding Context in Which the Public Administration Operates

In the words of Johnston (2015), "Public administration is the term traditionally used to define the formal arrangements under which public organizations serve a government, ostensibly in the public interest" and "... is the term used to define the formal procedural and organizational arrangements under which public employees serve a government, by implementing and advising on policy and managing resources. Organizational aspects refer to both the overall structures as well as the relationships that occur within public administrations" (Johnston 2015). It is usual to consider that the framework in which public administration entities operate is increasingly demanding, implying a greater effort of

collaboration and cooperation between the different social actors, aiming at a more efficient and higher quality public service that meets the changing demands of the community. The centrality of the state is viewed with suspicion. On the other side of the coin, as a response to the adversities of centralization, we find fragmentation and decentralization of the state; however, they are multidimensional and complex phenomena (Pereira and Correia 2022).

At the same time, public managers are forced to manage organizations that operate in an environment of great competition and dispute over scarce resources, where it is crucial to align their performance while maintaining the focus on their contribution to the development of society, with a special focus on the needs of the community. Thus, it must endeavor to keep up with this evolutionary dynamism, positioning local entities (local authorities) as agents with special skills to achieve this goal.

Public administration is often confronted with a set of limitations of different natures, such as financial, organizational, and political, that, on the one hand, prevent normal and regular action in its most different and heterogeneous missions and, on the other hand, motivate it—if not even oblige—to act to accompany and be able to respond to the demands of the community that needs it. Along with this need for action, we have the occurrence of the transformation that has developed in terms of the role and functions of the state over the last few decades, which has also been synonymous with changes in governance models (Correia et al. 2019a).

The public sector has some inherent characteristics, such as the existence of a political dimension, the scarcity of economic incentives, accountability to elected representatives, diverse and divergent objectives and priorities, absence or rarity of competition in organizations, and service supply/price ratio, among others, which constitute barriers to its performance. Notwithstanding the existence of such constraints, there are also positive dimensions that must be matured and properly planned in the management of any public policy cycle, such as the existence of a large budget, an increasing academic level of its staff, easy access to Big Data, related to citizens and the existence of relatively favorable conditions in terms of intra-organizational learning, as well as the ability to adjust to political changes and the diffusion of innovation (Rashman and Hartley 2002).

Service delivery with a focus on citizen needs takes place in a fragmented environment, which includes several stakeholders with different interests and missions (Haveri 2006) that must act in concert. Thus, keeping the focus on administrative processes or intra-organizational management carries risks (Osborne et al. 2013); i.e., organizations cannot aspire to persist over time if they remain self-focused. Instead, the motivation should be to promote platforms that integrate the contributions of different actors, fostering a broader paradigm that enhances both the management of inter-organizational relationships and the effectiveness of public service delivery systems (Osborne et al. 2013).

It is, therefore, crucial that there is a strategic and cohesive cooperation between the moment of defining public policies at the central level and their consequent application in the territory so that it can meet the needs of the communities. Many of the problems faced by these territories are related to a pattern of productive specialization based on activities with low added value and low technological intensity, strong segmentation of the labor market, precarious employment, structural unemployment, poverty, social exclusion, significant rates of early school leaving, inefficient use and management of resources with regard to soil and natural resources, and vulnerabilities to natural risks and climate changes (Correia and Lopo 2017).

When talking about intergovernmental cooperation—from a collaborative governance perspective—it is understood that many elements involve the structure developed for the object in question, and there are many factors that induce each of the autonomous public entities to give up a portion of their autonomy with a view to a single objective of a group of other autonomous entities (Correia et al. 2019b).

According to Ansell and Gash (2008), collaborative governance can be defined as "A governing arrangement where one or more public agencies directly engage non-state stakeholders in a collective decision-making process that is formal, consensus-oriented, and

deliberative and that aims to make or implement public policy or manage public programs or assets" (Ansell and Gash 2008, pp. 544–45). From the definition presented by these authors, six fundamental criteria that support collaborative governance stand out, namely: (a) the collaborative arrangement is initiated by public institutions or agencies; (b) participants include non-state actors; (c) participants are directly involved in the decision-making process, and they are not merely consulted by public agencies; (d) collaborative arrangement is formally organized and meets collectively; (e) the collaborative arrangement seeks to make decisions by consensus; (f) the focus of collaboration is on public management or public policies (Mendes et al. 2023).

It is from the recognition of the existence of this environment that the creation of conditions that allow for the development of collaborative platforms can be considered using two perspectives: firstly, the contributors to the positive results for society associated with collaboration can be evaluated, and, on the other hand, it is urgent to evaluate and anticipate the impact of possible barriers to the constitution of local-based collaborative arrangements, so that their effects can be minimized.

The following section will analyze the role that smart cities have been playing as value-generating practices for the creation, implementation, and development of sustainable territorial management policies.

1.2. The Need for Sustainable Land Management

As cities grow in number and population, they gain more economic, political, and technological power and increasingly take center stage globally. From an economic perspective, cities are becoming the centers of a globally integrated system and a service-based society. From a political perspective, they are at the center of a realignment of power, with greater influence but also greater responsibility. From a technological perspective, ongoing advances can provide them with a better understanding and control of their operations and development (Dirks and Keeling 2009).

The role that humans have played in the excessive use of the planet's natural resources has had serious consequences in terms of the ecological footprint (Moreno Pires et al. 2020). In recent years, there has been an evolution of environmental issues toward a broader sustainability approach, with environmental sustainability as the main focus, and establishing the adoption of more holistic approaches as fundamental in order to achieve the proclaimed paradigm shift (Disterheft et al. 2015).

In this way, the integration of sustainable development has progressively gained more relevance at the level of education, as Higher Education Institutions are increasingly assuming social and environmental responsibilities, playing the roles of agents in promoting sustainable principles (Stough et al. 2018).

Thus, this continuous increase in the size of cities and the number of inhabitants living in them will lead to dangerous environmental impacts, leading to a constant need to place sustainability and the environment as central themes in the ongoing search for sustainable globalization (Haughton and Hunter 2003).

1.3. The Importance of Information and Communication Technologies in Territorial Management from the Perspective of Smart Cities

Following the words of Bilhim (2004) closely, "the new electronic forms of information management represent an opportunity to increase political participation and horizontal communication between citizens", it seems appropriate to make a brief reference to the importance of Information and Communication Technologies (ICT) for the creation of smart cities since they stand out as a fundamental element for the construction of this concept. In fact, modernization and quality in public administration have always been a feature of all governance models (Quintas et al. 2023).

The number of initiatives has been increasing, and this may also be due to the unstoppable diffusion and integration of new technologies, especially information and communication. This increase has been widely exploited due to the diffusion of mobile devices,

which allow for a more active participation of citizens (Kirwan 2015). However, the role of ICT does not only represent the provision of technological solutions in connectivity initiatives that require data processing. Citizen participation is considered the key element in smart cities, and the possibility of giving voice to the citizen is even one of its most prominent objectives, giving him decision-making power (Pla-Castells et al. 2015).

2. Materials and Methods

This research article was conceived through a qualitative analysis, in which we resorted to the analysis of several bibliographic sources in order to, at first, identify the main dimensions of a smart city and select those that were defined by Giffinger et al. (2007) and then, to make as precise an approach as possible about the introduction and transformations that artificial intelligence can bring to public administration, more specifically, in terms of its implementation in smart cities. Thus, after identifying the dimensions, we will move on to a brief comparative analysis between two case studies of smart city projects on a global scale—Singapore and Amsterdam—concluding later with this approach on the role that administrative law plays in smart cities, as well as the implementation of artificial intelligence systems (hereinafter, AI) in this urban model in order to realize the relevance that these two criteria can play in the construction of a smart city project.

2.1. Smart Cities and Their Dimensions

Some authors have developed a proposal for operationalizing this concept. Their aim was to prevent and avoid the risk of incorrect designations. Thus, there are six distinct dimensions that form the pillars for measuring the degree of intelligence of a city; they are Smart People, Smart Economy, Smart Governance, Smart Environment, Smart Mobility, and Smart Living (Mendes et al. 2021).

Therefore, starting with the Smart People dimension, it measures, through some parameters, the population's education levels, employability levels, among other relevant data; Smart Economy assesses a city economically—more specifically, its degree of competitiveness—and reflects how well prepared it is, through the use of some parameters, such as the number of companies based as well as their quality or their tendency toward entrepreneurship; Smart Governance is directly related to public participation, more specifically, to participatory governments and also to the functioning of the administration in terms of the service provided to citizens, because it is essential that there is adequate management in order to avoid the risks arising from the lack of resources and capacities on the part of local governments (Oliveira et al. 2023); Smart Environment is determined by the management of natural resources and environmental protection, always ensuring good management of urban waste and the preservation and creation of green spaces; Smart Mobility concerns the local and international accessibility of cities and the respective network of communication and information technologies; finally, Smart Living encompasses, as the name implies, issues related to quality of life, such as health, inclusion, safety, culture, among other aspects that concern our daily lives (Selada and Silva 2020).

Thus, these pillars of a smart city materialize in smart urban solutions, which can be seen in an integrated way, spread across the most diverse areas, such as energy, mobility, waste and water management, and governance, among many others (Selada and Silva 2020). Some practical applications of these smart urban solutions in terms of mobility include, for example, smart parking management, real-time traffic control systems (smart traffic), and the promotion of public transport. On the environmental side, there are also numerous examples of practical measures that can be implemented and that would undoubtedly have very positive consequences. We refer to the use of equipment for remote monitoring of energy consumption, the application of load limitation sensors in waste containers, ecopoints, and smart public lighting (ibid. 2020).

For the other dimensions, there is also a diversity of solutions to respond to the various challenges society and the world in general face, both in terms of governance and people, without ever forgetting the aspects of the economy and smart living. Above all, and it is

important to emphasize, a smart government must be endowed with a long-term vision since plans must be designed with the future in mind in order to be able to correctly guide public policies. Moreover, this long-term vision must always be combined with a solid knowledge base, in that a careful diagnosis of the situation in which the city finds itself must be made so that its future development potential can be more closely understood (Fernandes 2016).

2.2. Smart City vs. Ecocity

In addition to the concept of a smart city, other concepts in this area have been emerging. Currently, there is a distinction that we cannot fail to present, given the relevance it has gained: smart city vs. ecocity. Previously, we presented the concept of a smart city, as well as its respective definitions, but the concept of ecocity differs somewhat from the previous concept.

There is still no universally accepted definition for this concept in the scientific community. Thus, the one we have chosen and will use as a base definition was developed by Ecocity Builders and the International Ecocity Framework and Standards (IEFS) advisory team on 20 February 2010 in Vancouver, BC, Canada. According to this perspective, ecocity is a human settlement modeled on the self-sustaining and resilient structure and function of natural ecosystems. An ecocity provides healthy abundance for its inhabitants without consuming more (renewable) resources than it produces, without producing more waste than it can assimilate, and without being toxic to itself or to neighboring ecosystems (Singh and Tiwari 2016). Moreover, its social order reflects fundamental principles of equity, justice, and parity (Leźnicki and Lewandowska 2014).

We will now present a real example of an ecocity: the city of Masdar. Based in the desert next to the capital of the United Arab Emirates, Abu Dhabi, it started to be designed and developed in 2006 and is seen as one of the first sustainable, smart, and carbon footprint-free projects in the Middle East. It unites renewable energy sources with the efficient use of resources (Lau 2012) and has even been designated as a living lab for sustainable urban technologies (Cugurullo 2013).

Masdar was designed to consider the highest possible level of sustainability for the vast majority of aspects of life. It was meticulously designed by the Abu Dhabi power company to conserve energy through solar panels and geothermal plants. One of the goals is to reduce waste with its unique and highly innovative recycling system. On the other hand, another focus is to restrict water consumption by using desalination machines, drastically reducing carbon emissions through elaborate transport plans (World Commission on Development and the Environment 1987). Although few buildings have yet been completed, project officials claim that the largest solar photovoltaic plant in the Middle East is in operation there (Lau 2012).

Indeed, we can observe that the concepts of smart and ecocities have some points of convergence, but at their core, they end up being distinct concepts since an ecocity is based on a 100% sustainable society, and its main focus is the environmental challenges that have been increasing, requiring more immediate and more "radical" responses. A smart city, on the other hand, as mentioned above, has more than one main focus and is subdivided into the six dimensions presented.

Nowadays, global examples of smart cities have been multiplying, with more and more cities implementing smart strategies. Thus, we should look at the "Smart City Ranking 2023", developed by the Institute for Management Development in collaboration with the Singapore University of Technology and Design (2023), composed of 140 cities from all parts of the globe (Table 1).

Table 1. Smart City Ranking 2023.

Position	City
1	Zurich
2	Oslo
3	Canberra
4	Copenhagen
5	Lausanne
6	London
7	Singapore
8	Helsinki
9	Geneva
10	Stockholm
11	Hamburg
12	Beijing
13	Abu Dhabi
14	Prague
15	Amsterdam

Source: own authorship, based on International Institute for Management Development (2023).

It should be noted that this ranking is based on five key areas: safety and health; mobility; opportunity; activities; and governance.

In addition to the ranking, the Institute for Management Development also carried out an in-depth analysis of each of these 140 cities by measuring each of these indicators as well as a set of baseline incentives.

As we can see in the table above, eight of the ten cities that make up the top 10 smart cities ranking are in Europe. Compared with the last ranking (2021), we can see that representation from Asia reduced from two to one city (Taipei is not listed in the current ranking), and Oceania switched its representation from Auckland to Canberra. Another relevant aspect from which we can draw conclusions is that the city of Amsterdam (known as the first smart city) is currently in the 15th position, having moved from the 17th position in the 2021 ranking.

We will, therefore, analyze two cities more closely: Singapore and Amsterdam.

2.2.1. The Study Case of Singapore

For the past three years, Singapore has been one of the benchmark cities in this ranking. When the IMD Smart City Ranking was published in 2021, the city of Singapore occupied the 1st position. However, with the publication of this ranking, the 2021 position was changed from the 1st position to the 7th position (the same as the current ranking of 2023). Rankings prior to 2023 have been adjusted according to the new methodology for the purposes of homogeneity and to allow comparison. In 2023, the SCI comprised the 15 cities from the table above (International Institute for Management Development 2023).

This smartization project is under the umbrella of Smart Nation Singapore and is called the Smart Nation Platform (SNP). The main aspect in which the city excels is in the use of innovative state-of-the-art technologies, as well as in solving structural problems using disruptive paradigms (Shamsuzzoha et al. 2021). Going back a bit in history, we find that the first national technology plan was drawn up in 1980. Since then, six plans have been implemented, with the aim of making Singapore the first "smart island". As early as 2015, Smart Nation Singapore emerged with the clear goal of becoming the world's first smart nation (Foo and Pan 2016).

For Singapore, the notion of a smart nation is based on its ability to collect data, interpret it, gather knowledge, and channel it into meaningful action. This initiative is built on the following three key areas: connecting; collecting; and understanding (ibid. 2016).

There are three reasons why Singapore has focused on these three areas: firstly, the elderly population is expected to reach 900,000 by 2030, which creates a strong and urgent need for adequate infrastructure in housing, hospitals, and workplaces to meet the needs

of the elderly. Secondly, like any cosmopolitan city, sustainable urban mobility solutions are needed to address existing congestion problems. Last but not least, accessibility to data would greatly help in the decision-making process, allowing for better-informed decisions (Balakrishnan 2015).

A key aspect of SNP is the development of better awareness through the collection and sharing of real-time data. An important step toward realizing this occurred in 2014 when the Singapore government installed around 1000 sensors across the island to track data on everything from air quality and water levels to public safety. These data are then sent to government agencies, which analyze them in detail (Foo and Pan 2016).

2.2.2. The Study Case of Amsterdam

Although the city of Amsterdam only appears in the 15th place in the Smart City Ranking 2023, we could not fail to mention it, as it is considered the 1st existing smart city project.

Supported by the belief that ICT contributed to the improvement of the functioning of cities (Baron 2012), three organizations emerged and together initiated the currently ongoing Amsterdam Smart City (ASC) Programme: the Amsterdam Innovation Motor; Liander; and the Amsterdam city administration (Mora and Bolici 2017). The ASC was established in 2009 to increase collaboration between citizens and organizations in finding solutions to solve the city's environmental problems—such as reducing CO_2 emissions (van Winden et al. 2016). Both government and non-governmental organizations can initiate a project to address specific urban environmental problems. However, the ASC focuses its efforts mainly on energy and mobility issues (ibid. 2016). Each project has its own indicators for specific phases, such as development, implementation, and evaluation (Putra and van der Knaap 2018).

In ASC, the operationalization of a smart city focuses on the creation of small local projects via the use and creation of innovative technology, creating changes in behaviors, and using sustainable economic investment. Furthermore, in ASC, all projects developed are the result of collaboration between citizens, communities, and associated companies (Putra and van der Knaap 2018). Thus, the ASC is also an example of how a city can recognize and incite participation to educate and unite city actors (Kusumastuti 2017). Nowadays, this is supported by the development of ICTs, so information exchange can be realized through digital technologies—e.g., websites and apps (Putra and van der Knaap 2018).

In the view of Iizuka (2013), innovation systems have changed their focus from being firm-centered to being community-centered. This means that innovation systems are now used not only to improve the performance of firms but also to improve the quality of life of communities. An innovation system that emerges in an urban area is typified as an "urban innovation system" (Putra and van der Knaap 2018).

This project is supported by four pillars. These are the following: firstly, a collective approach, i.e., each project implemented under ASC is based on cooperation between all relevant parties to achieve feasible results; secondly, innovation and awareness—the project should not only be based on innovative technology but also needs to incite behavioral changes; thirdly, knowledge dissemination, which refers to the exchange of knowledge between stakeholders through the sharing of experiences made on the ASC platform; and lastly, the project must be economically viable to have a higher chance of progression. In fact, ASC does not only aim to implement projects in Amsterdam, but also to replicate them in other cities (Putra and van der Knaap 2018).

3. Smart Cities, Artificial Intelligence, and Administrative Law

3.1. The Role of Administrative Law

There has been growing research into areas where artificial intelligence and innovation could provide added value in increasing the quality of the public service provided. The topic of artificial intelligence in the context of public policy has been worked on in the international context and, in particular, in Portugal (Correia and Garcia 2023). As an

example, we have the study of Pereira et al. (2023) where a mapping of studies was carried out on innovation and digital transformation in the justice sector. The internal norms of the digital community serve as a parameter for the decisions taken by companies regarding the regulation of speech or, in the mildest words used by them, the moderation of content inserted on the platform by users (Freitas et al. 2023). The internet and the various digital contact methods that have sprung up over the past 20 years are becoming more and more important for social interactions and human connection. However, this could mean facilitating communication and democratizing access to goods and services was, at the same time, a precursor to serious damage in terms of self-determination and access to knowledge and information. (Freitas et al. 2023).

When it comes to analyzing smart cities, the use of artificial intelligence (AI) and its impact on public decision-making should be discussed. Thus, smart cities invite administrative law to act in scenarios that were little explored or even non-existent before this new reality.

Although the proper understanding of the use of AI in the implementation of smart cities in Portugal imposes interdisciplinarity, the following lines only question the role of administrative law in regulating the impacts that AI may cause from the outset in the implementation of smart cities.

It will tend to be a phenomenon that requires multi-level legal treatment, i.e., at least at the national, European (with the European Union in the running—(Cantero Gamito and Ebers 2021; Cabral 2021)), and international levels. Furthermore, it is important to emphasize that AI applications must not only conform to legal principles in their design but also in the outcomes they produce. This means that they must adhere to a core legal standard, specifically, the principle of equal treatment, while also respecting other fundamental rights.

In addition to upholding a sufficient level of the rule of law that AI projects and systems must not undermine and should, in fact, enhance, each individual project and system will introduce its unique legal challenges. These may include issues already identified, such as the legal responsibility of autonomous entities, as well as those stemming from the utilization of AI for routine legal tasks (Pedro 2023).

Although AI has invaded the "legal city", the truth is that the legal city tends to be slower than technology. This slowness, which may even be healthy, does require institutional preparation with adequate technical knowledge for the understanding, development, and application of the different public policies referred to; otherwise, it will rest on the knowledge and services provided by private companies whose scope by nature does not tend to coincide with the protection, primarily, of the public interest.

Legislative and administrative regulations, even if they are carefully crafted to protect innovation, must prioritize the preservation of essential values, with a primary focus on ensuring equal treatment. It is important to note that there is a shared concern that AI tends to exacerbate inequality. This inequality is not only immediate, as seen in cases of biased treatment in contexts like law enforcement and AI-assisted job interviews or offers, but also indirect. Despite some efforts to promote education in computer science and programming, the reality is that only a small portion of individuals will truly master AI techniques. This trend is leading toward a future where AI-driven businesses are dominated by wealthier classes (Pedro 2023).

Nevertheless, it is worth mentioning that if the anticipated progress and development of AI come to fruition, future inequality may result from only a select few reaping the benefits of AI's positive impacts, while the risks are borne by society as a whole.

Finally, it should be borne in mind that the main administrative rules in force and which should apply to initiatives such as smart cities were not designed to be applied to this scenario, which may generate some imbalances, which may require a regulatory framework to ensure respect for the principles, values, and rights enshrined in our legal system. Regardless of the approval of a possible new regulatory framework, it should be

made clear that the admission of smart cities requires the fulfillment of a set of administrative guarantees.

3.2. Some Guarantee Requirements of Administrative Law

In general, the legal system, while solidifying public policy choices, cannot ignore the social and economic transformations that AI is poised to bring. It should actively function as an equalizer and protector of various aspects of human dignity as these changes unfold. The concept of implementing smart cities should not disregard the protection afforded by administrative law.

Considering the significant impact of public activities on the lives of citizens, it becomes clear that administrative law must take into account the influence of AI systems in these activities. In other words, as public tasks increasingly involve AI systems or benefit from their support, administrative law should establish regulations right from the start. These regulations should cover the approval of such systems and their operational guidelines in alignment with the legal and administrative safeguards that are standard in administrative activities (Pedro 2023).

There is no justification for diminishing the procedural safeguards of individuals with legitimate rights and interests when it comes to administrative decisions that may impact their legal status. Promoting innovation should not come at the expense of citizens' rights. The principles of the rule of law, access to the courts, and respect for fundamental rights, along with key principles like transparency, impartiality, and fairness, all underscore this point. In essence, public activities carried out by AI systems must not operate outside the bounds of the law (Carrero and Ribeiro 2019).

Administrative activities involving AI systems must adhere to a set of guarantees rooted in the principles of good administration and general administrative procedures. These activities should also be equipped with legal mechanisms that ensure that affected individuals have access to appropriate administrative and judicial safeguards. There should be no areas of immunity in the realm of smart local administrative activities (Pedro 2023).

Furthermore, the need to strengthen these safeguards might arise depending on the type of AI system in use, especially in cases involving automated administrative decisions driven by algorithms, often referred to as "Public Administration 4.0." (Griffi 2018).

3.3. Smart Local Government: Transparency and Rationale

The decision to integrate AI systems into public activities, whether undertaken by public entities or individuals performing public roles, particularly in the development and operation of smart cities, compels administrative law to navigate uncertain terrain. This uncertainty arises not only from the inherent traits of AI, such as opacity, complexity, data dependence, and autonomous behavior, but also because the utilization of AI systems by public authorities is still evolving (AMA 2022). Furthermore, it is noteworthy that the concept of smart cities is relatively new and evolving.

Despite the challenges presented by these complexities, it is imperative that administrative activities conducted through AI systems adhere to fundamental principles of administrative law, notably, the principle of good administration. In essence, the governance and legality of AI systems and algorithms must be addressed (Appel and Coglianese 2020), even in the absence of a specific regulatory framework.

Therefore, the decision to employ an AI system within the realm of public administration should be subject to public scrutiny. In other words, before utilizing an AI system for administrative purposes, it must undergo a process of public approval (Valero-Torrijos 2019), possibly through a formal "public act" that includes an appropriate administrative procedure, especially when algorithms are in play. This approach is essential for evaluating the potential risks associated with AI systems and their appropriateness. It allows for the application of the three tests mandated by the principle of proportionality when assessing the manner and risks involved in administrative activities. Furthermore, this public

scrutiny should extend to the ongoing monitoring of AI systems throughout their lifecycle (Pedro 2023).

The specific traits of certain AI systems, especially those driven by algorithms, which include opacity and the inability to explain their decisions, underscore the importance of the principle of good administration in enhancing the transparency and reasoning aspects of administrative decisions (Appel and Coglianese 2020; Gil Cruz 2021).

In the context of guaranteeing transparency, it is crucial to acknowledge a safeguard that encompasses not only the outcome of the application but, most importantly, the source of the data used and the processing procedures employed (Valero-Torrijos 2019).

The necessity for prioritizing transparency also stems from the fact that a significant portion of AI systems used by the public administration may be developed by private entities. This prevents the public administration from being locked into or guided solely by the standards set by these private entities. As a general rule, the public administration should be obligated to proactively disclose the fundamental principles underpinning the algorithms. This, in turn, assumes that the AI systems in question are transparent, meaning that they enable the explanation, examination, and replication of decisions and data usage within those systems. In essence, the "glass house" concept (Gonçalves 2019), which should characterize public administration, does not align well with the presence of "black boxes" (Wischmeyer 2020), referring to the opaque processes or implicit reasoning of AI systems.

In summary, when it comes to establishing and running smart cities, a clear and unwavering commitment to transparency is essential. Additionally, the unique demand of the principle of good administration entails that administrative actions backed by AI systems must be thoroughly justified, considering the specific characteristics of the administrative decisions in which these systems are employed. Most importantly, these decisions should be comprehensible to individuals without specialized knowledge to assess the technology's implications (Valero-Torrijos 2019).

4. Discussion

One of the main concerns that arises when it comes to the transparency of AI systems in administrative activity (Orofino 2020) is that of access to the source code (which appears as the expression of the program in the form and text written in a programming language) and the algorithm for public use (Cotino Hueso 2022). In other words, the source code appears as one of the fundamental elements (along with the characteristics and variables), but not the only one, for the knowledge of the functioning of the functional model of the digital algorithm. Access to the source code is a necessary but not sufficient condition for ensuring transparency (Gutiérrez David 2022). The aim is to ensure scrutiny of the public activity of systems that autonomise administrative activity.

Access to the source code and other elements of knowledge of the functional model of AI becomes important due to the need to exercise the rights of the administrators. In legal terms, the measure of transparency seems to be marked by the guarantee of the exercise of rights, including the right of defense. Access to the source code, the algorithm model, the documentation, and associated information (technical specifications, description and characterization of the dataset, etc.) will be the key to better understanding some pathologies of AI systems and the tool that will allow for the judicial review of autonomous administrative decisions (Gutiérrez David 2022), ensuring the right to full effective judicial protection. Therefore, the exercise of the right of access to the source code must be guaranteed.

Nonetheless, it is important to consider that rendering an algorithm comprehensible to the general public presents a significant challenge, primarily for two main reasons. First, translating lines of code into human language is a complex endeavor. Second, determining the extent to which the code should be open, including the elements required for a comprehensive understanding of the system while excluding modules that pose security risks, can be a difficult task (Cluzel-Métayer 2020).

5. Conclusions

This article allowed us to draw a number of conclusions at various levels. From the perspective of the impact that the implementation of AI systems has on public administration, we can conclude that they can bring some advantages from the perspective of citizens, as processes can be simplified, becoming faster and more accessible, by reducing bureaucracy and obsolete steps. From the perspective of their implementation in smart cities, these AI systems bring speed not only to the process of transforming cities but also (when well-applied) to increase the quality of life of citizens.

Looking at it from a legal standpoint, we must not overlook the necessity, in line with the principle of good administration, to provide adequate justification for all administrative actions facilitated by AI systems. This justification should consistently consider the unique characteristics of the administrative decisions where these systems are permitted.

Furthermore, it is crucial to recognize that these justification requirements should also consider the distinct features of AI systems employed by the public administration. Failure to ensure the comprehensibility of administrative decisions may ultimately render them invalid.

In addition to these conclusions, this research has allowed us to list some objectives for future research that, in addition to being very topical, are of great relevance. Thus, an investigation that seems to us to be very useful and practical would be the possibility of ascertaining the types of AI systems that can be adapted and applied at the level of smart governance, as well as the possibility of ascertaining what challenges the implementation of these technologies would bring to citizens in their daily lives, both in terms of the advantages it would bring in reducing bureaucratic processes.

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Digital Access to Judicial Services in the Brazilian Amazon: Barriers and Potential

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Abstract: This study investigates the influence of geographical barriers and the challenges and advantages presented by information and communication technologies on digital governance within the judicial branch in the Brazilian Amazon region. The primary objective is to provide diagnoses and recommendations that can inform the construction of research for the development of policies aimed at enhancing access to judicial services by riverside populations. The methodology initially employed was a comprehensive literature review on digital governance within the judiciary and access to justice for vulnerable groups in a geographical context. Subsequently, a qualitative study was conducted, employing participant observation in the riverside communities of Itapéua and Boca do Una, situated along the Jaurucu River within the Porto de Moz District in the state of Pará. The insights garnered from respondent perceptions and participant observations were synthesized to formulate five key dimensions for digital governance and access to justice within Amazonian communities: (1) one's experience with justice, (2) access to information, (3) geographical barriers, (4) user-friendliness of technology, and (5) resources and infrastructure supporting technology use. The study concludes that there are compelling indications that tailored digital governance and technology utilization by the judiciary, adapted to regional nuances, can significantly contribute to streamlining access to judicial services.

Keywords: New Public Governance; digital transformation in the judiciary; access to justice; Amazon region; riverside populations

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1. Introduction

The digital transformation has exerted a profound influence on the Brazilian judiciary in recent years, particularly with the expansion of judicial services offered in a digital format. The "Justice in Numbers" report, compiled by the National Council of Justice (Conselho Nacional de Justiça 2022), establishes a correlation between the uptick in digitized cases and enhanced performance in quantitative terms. Nonetheless, the incorporation of new digital solutions within the judiciary necessitates an examination of additional barriers (Maia and Correia 2022b), conveniences, and opportunities (Torlig et al. 2023) linked to access to justice. It is crucial that digital governance takes into consideration the assessment of the organizational impact of employing novel technologies for such access. Despite considerable efforts directed toward addressing the issue of access to justice over the years, persistent geographical barriers in Brazil have impeded individuals and groups in vulnerable situations from exercising their rights in the geographical sense (Torlig et al. 2023).

In this context, the Brazilian Amazon region emerges as a pertinent focal point for research. It holds strategic geographical importance (Moreira 1960), encompassing roughly 60% of Brazil's territory (Instituto Brasileiro de Geografia e Estatística 2023). From a social and human standpoint, it is characterized by a predominance of riverside populations residing along its vast rivers, who often contend with substantial travel distances to access

urban centers concentrated with public goods and services designed to fulfill their rights (Calegare et al. 2013). Yet, despite this significance, there is a noticeable dearth of theoretical and empirical research on access to justice in the Brazilian Amazon region.

This article seeks to investigate the impact of geographical barriers, as well as the impediments and advantages presented by information and communication technologies, on the digital governance of the judiciary in the Brazilian Amazon region concerning access to digital judicial services and, consequently, to rights for riverside populations. The objective is to provide diagnoses and proposals that can inform the development of policies aimed at facilitating such access.

To achieve this goal, the methodology employed involves a literature review designed to assess the current state of digital governance within the judiciary and access to justice and rights for individuals and groups in vulnerable situations, particularly in the geographical context. Additionally, we scrutinized the life context of the riverside population in the Brazilian Amazon region and the municipality of Porto de Moz, Pará, through documentary research, data collection, and participant observation. Subsequently, we analyzed and deliberated on the data collected through participant observation and qualitative research based on interviews with residents of the Amazonian riverside communities of Itapéua and Boca do Una, focusing on their perception of digital access to justice. Both are situated on the banks of the Jaurucu River, belonging to the municipality of Porto de Moz. Finally, based on the observed results, we formulated diagnoses and present proposals to contribute to the construction of research for the development of policies that facilitate access to justice and rights for riverside populations, along with outlining a research agenda.

2. Digital Governance in the Judiciary and Access to Justice: A Theoretical Framework

Advancing digital governance within the judiciary as a means to enhance access to justice for individuals and groups facing geographical vulnerability is a policy in its nascent stages within the current Brazilian landscape. Nevertheless, its potential impact on social transformation is considerable. The existing body of academic research that intricately links these two themes is in the construction phase, especially considering the region chosen for the research. In an advanced search on Google Scholar, using the words "digital governance" and "access to justice", 564,000 results were listed. When including the word "Amazon" in the same search, the location subject of this research, only 70,700 results were found.

Subsequently, we employed the keywords "digital governance" and "Amazon" on Google Scholar, along with "access to justice" and "Amazon" simultaneously in both English and Portuguese, refining our search parameters in the "subject" field within the "advanced search" mode. The results were meticulously read and examined to ensure alignment with the search criteria specified in the article titles. Regrettably, only three (3) articles were unearthed, underscoring the paucity of research on this vital subject. The situation of geographic vulnerability of riverside populations constitutes a relevant barrier to access to judicial services. Digital justice instruments have the potential to improve access to justice or accentuate rates of social and digital exclusion. Therefore, verifying the perception of the riverside population is an important basis for research on judicial policies in this scenario.

The following Table 1 delineates the scientific articles pertinent to the topic:

This context underscores the imperative for advancing both theoretical and empirical research that bridges the conceptual realms of digital governance and access to justice, particularly in the Brazilian Amazon, where the geographical vulnerability of riverside populations poses a significant barrier to accessing rights and justice. Initiatives aimed at enhancing the reach of digital justice can either ameliorate access or exacerbate rates of social and digital exclusion. Therefore, gauging the perception of the riverside population becomes a pivotal foundation for advancing judicial policies in this challenging setting.

Table 1. Current state of digital governance and access to justice in the Brazilian Amazon.

Paper Title	Author(s)	Country	Theme	Approach	Year
"Amazônia e acesso à justiça em tempos de pandemia" ("Amazon and Access to Justice in pandemic times")	Melo, Sandro Nahmias and Corrêa, Igo Zany Nunes	Brazil	Access to justice, labor justice, itinerant ustice, pandemic.	Theoretical	2022
"Access to justice, Labor Justice and the implementation of a 100% digital court in the Pará Amazon"	Andrey, José da Silva Gouveia and Andreza, do Socorro Pantoja de Oliveira	Brazil	Access to justice, 100% digital court, labor justice, the Amazon.	Theoretical	2023
"Indigenous lands in the Western Amazon: rights violations and narrow access to justice"	Padilha, Lindomar Dias and Salles, Denise Lopes	Brazil	Access to justice, demarcation of indigenous lands, the Amazon.	Theoretical	2019

Source: Prepared by the authors.

2.1. Digital Governance in the Judiciary

The evolution witnessed in public administration models is intrinsic to the dynamic way the state functions, especially within the realms of the economy and society (Resende et al. 2022). We transition from a producer/authoritarian state model, characterized by minimal social intervention, to a regulator/financier state. This shift was prompted by the imperative to proactively address the social devastation resulting from the two major world wars. Subsequently, the adoption of a partner/negotiator state model followed, necessitated by the need to seek external forces to counteract the deleterious effects of successive global economic crises in the 1970s (Maia and Correia 2022a). A context of heightened pressure on governments to become more efficient and effective emerged, transforming the initially hierarchical and bureaucratic model into what is now known as "New Public Governance" (Moraes et al. 2023). This new model encapsulates the plural essence of the contemporary state, wherein various actors contribute to the provision of public services and the formulation of public policies (Dickinson 2016).

In recent decades, the evolution of public governance has been closely tied to technological transformations culminating in the current digital age (Cepik et al. 2010). Alongside the societal shift towards digital transformation (Freitas et al. 2023), the use of information and communication technologies by public sector organizations has expanded, following a trend commonly referred to as "e-government" (Henning and Ng 2009).

The public administration recognizes that developing and implementing public policies using new information and communication technologies is a crucial mechanism for ensuring broader access, transparency, efficiency, and quality of public services while also promoting citizen participation in the decision-making process (Maia and Correia 2022b). The perception of the service user has gained prominence as a vital variable for constructing relevant public policies (Ye et al. 2023). Information and communication technology has become an indispensable means of exchange between the poles of public administration and citizen relationships.

In the digital governance era, information and communication technology ceases to be created and used solely for the internal management of administrative processes (Horobeț et al. 2023). Indeed, it becomes part of a holistic planning that encompasses the goals and purposes of the institution and engages with and serves the entire user base, being an integral part of the political and multi-sectoral reality of the public sector (Maia and Correia 2022a).

The use of digital technology in the judicial system would improve the ability to resolve conflicts and create opportunities to increase access and law enforcement (Kondori and Saeed 2021). It refers to the judiciary use of information and communication technologies to provide quality services and access to knowledge, thereby increasing citizen participation (Erkut 2020).

Therefore, digital governance transcends the mere implementation of innovative technologies for public services in electronic format (Ravšelj et al. 2022) since it also encompasses added value through innovation, fostering diverse relationships related to information, communication, and transactions. This includes enhancing accessibility, improving the quality of public services, internal efficiency, and increasing citizen participation in the political decision-making process (Maia and Correia 2022a).

The support of technology for the provision of judicial services has the potential to, in theory, increase the processing of cases in digital format, causing possible improvements in performance and increasing access to justice. The development of technologies in judicial systems must be in accordance with procedural law and fair adjudication. Therefore, solutions must be found within the scope of judicial governance (Reiling and Contini 2022).

In the judiciary, governance encompasses a set of factors essential for enhancing the delivery of justice, striving to achieve its intended goals with efficiency, quality, and humanity (Borba et al. 2023). It is a multifaceted and plural concept, representing the manner of conducting affairs within the organization, distinct from, and not presupposing, good governance itself (Akutsu and Guimarães 2015). Judicial governance is not limited to the implementation of new theories and management techniques, as it considers judicial independence as a central value (Ng 2011).

The Brazilian judiciary has undergone substantial impacts from the digital transformation process, particularly in the last three years, driven by an increased influx of innovation and technology within the post-pandemic justice system (Oliveira et al. 2023). Noteworthy are various programs and initiatives accelerating the adoption and implementation of information and communication technologies, the impact of which is meticulously assessed through data panels centralized by the Brazilian National Council of Justice (Conselho Nacional de Justiça 2022).

Initiatives like the digitization of the Brazilian justice system's backlog, computerization of judicial proceedings, virtual services offered by the virtual branch and the 100% digital court, and others incorporated into the Justice 4.0 Program have been instrumental (Conselho Nacional de Justiça 2023). Despite the most severe health crisis of the century (COVID-19), not only was judicial service uninterrupted, but innovations were introduced, improving the handling of the monumental procedural backlog and the duration of legal proceedings. This has yielded better performance rates, though not entirely sufficient to drastically reduce the national backlog of pending cases (Conselho Nacional de Justiça 2022).

The digital transformations implemented, especially after the start of the pandemic (COVID-19), focused on maintaining the functioning of the judicial service even with the closure of the physical structures of the judiciary. Inserting processes into digital systems, serving lawyers online, improving notary routines with the use of artificial intelligence, and holding hearings in digital format are some examples of the changes implemented in Brazil regarding digital judicial access (Conselho Nacional de Justiça 2022). However, nothing specific has yet been developed to increase access to judicial services for people who live in locations very far from urban centers. Geographical barriers related to access to justice have not yet been sufficiently addressed in Brazil.

Judicial governance practices aimed at influencing the accessibility and performance of the judiciary must extend beyond seeking improved productivity rates or a reduction in case backlogs. Consideration must be given to the axes of humanization and access to justice, especially for geographically vulnerable groups (Pereira et al. 2022). Furthermore, for justice to achieve its primary objectives, it must be embedded in a faster, more sustainable, and human-centered model.

Therefore, innovation places e-government in the judiciary as a means to leverage new information and communication technologies, rendering justice more accessible, effective, and accountable. However, alongside this opportunity, digital governance also presents the challenge of addressing problems associated with digital exclu-

sion/division/inequality, often rooted in pre-existing social inequalities and exacerbated by the digital age (Maia and Correia 2022b).

Collaborative efforts are necessary to ensure that digital governance not only enhances the performance of justice, but also becomes more accessible to vulnerable population groups. The use of information and communication technologies, in this context, can reshape interactions between citizens and public administration (Barbosa 2017). However, the specific challenges and risks involved must be observed, such as the relevance of the processes, legal restrictions, guaranteeing the independence of the judiciary, good system design, user experience, and high interoperability (Yavuz et al. 2022).

Thus, implementing changes that steer the judiciary toward the adoption of new strategic innovation solutions is important for overcoming existing barriers to access to justice for the most geographically vulnerable (Torlig et al. 2023).

Digital governance in the judiciary should not solely focus on implementing new information and communication technologies that drive the digital transformation process. It is equally important to align these implementations with the development of innovative judicial management and governance tools and processes capable of democratizing access to rights and justice (Henning and Ng 2009). Finally, it is crucial to align citizen participation in decision-making processes through online interactions (Maciel and Stéphanie 2020).

2.2. Access to Justice for People and Groups in Situations of Geographic Vulnerability

Access to justice is a topic that has been addressed for a considerable amount of time and is recurrent in the literature, both national and foreign. Research has focused on trying to find alternatives to enable a balanced legal system, in which people, especially in vulnerable situations, can achieve denied rights and, in this way, guarantee life in a greater context of possibilities (Torlig et al. 2023). However, what still exists in the Brazilian context is the existence of people and groups in vulnerable situations, especially in a geographical sense, for whom access to the most basic rights, such as the simple issuance of civil documents, can still be considered a challenge (Sadek 2009).

Although there is no single definition, access to justice was indicated by the World Justice Project as the ability of all people to seek and obtain effective solutions through accessible, impartial, efficient, effective, and culturally independent justice institutions (Voert et al. 2022).

Access to justice was treated by Cappelletti and Garth (1988) as a topic that is difficult to define, but which serves to determine two basic purposes of the legal system. The first relates to the way in which people can claim their rights and/or resolve their disputes, which must be truly accessible to everyone; the second purpose focuses on producing results that are individually and socially fair. To this end, the authors indicated the existence of three major waves relating to the barriers encountered to access to justice, which would be related to the indispensability of free judicial services for financially insufficient people, the judicial representation of diffuse and collective interests in access to justice, and new configurations of institutions and actors to promote the aforementioned access (Cappelletti and Garth 1988).

Furthermore, access to justice is highly important for societies concerned with combating inequality and the prevalence of fundamental human rights. Its denial could result in the denial of other rights (Pessoa 2016). The importance of the topic is corroborated by the treatment given to access to justice as a fundamental human right in international human rights treaties (UN-United Nations 1948) and in the UN 2030 Agenda, with the inclusion of one of the sustainable development goals (UN-United Nations 2015).

There are studies that differ in their focus on the type of subjects seeking access to justice. Some indicate everyone's right to obtain justice, while others refer to people who are in vulnerable conditions and, particularly, would face difficulties in accessing justice. Vulnerability, in this aspect, could affect any person, determined situationally and socially, as in the case of an imbalance of power between the parties to a legal relationship (Voert et al. 2022).

In Brazil, there are regions characterized by a high degree of geographical vulnerability, such as that experienced by populations inhabiting the Brazilian Amazon region. This vast tropical forest, occupying approximately 5 million km^2 (around 60% of the national territory), constitutes the Legal Amazon, spanning nine Brazilian states and 808 municipalities, hosting one-third of the planet's plant species (Ministério do Meio Ambiente 2023), with a total population estimated at 27,783,584 million inhabitants, according to the 2022 demographic census (Instituto Brasileiro de Geografia e Estatística 2023).

Hence, investigating the influence of geographical barriers and potentialities on access to justice and rights for the riverside populations of the Brazilian Amazon is imperative. Building on possibilities offered by digital governance in the judiciary, this investigation enables the formulation of diagnoses and proposals, which is essential for developing policies to enhance this access. Such measures are indispensable for constructing a judiciary that aligns more closely with democratizing its reach and effectively resolves conflicts and realizes rights, thereby determining the extent of its own legitimacy.

2.3. Digital Governance and Access to Justice in the Brazilian Amazon Region: Barriers and Potential

In order to investigate the possibilities of increasing access to judicial services through digital justice, the so-called riverside population of the Brazilian Amazon region was chosen as the research object, understood as people and family groups who reside on the banks of the rivers that run through the Amazon Forest in Brazilian territory. These groups live in communities characterized by their unique features and often lack roads for transportation. Consequently, they need to use boats to cover long distances in search of access to the public goods and services they require (Lira and Chaves 2016).

The riverside communities of the Brazilian Amazon represent a melting pot of diverse social groups that have traversed the region—indigenous people, northeasterners, and migrants from other regions. In itself, this reality entails various constraints, especially in terms of travel within the region to access the nearest urban areas where various public services are typically concentrated (Gama et al. 2018).

Designated as traditional Amazonian communities, these groups manage natural resources and social organization with a unique model, drawing on extensive knowledge to sustain and manage Amazonian resources. Inherited from their ancestors, this knowledge solidifies social relations, constructs social identities, supports common projects, and manifests diversity (Lira and Chaves 2016). Respecting a population's perception and way of life extends beyond acknowledging human beings and their cultural expressions; it serves as a means of preserving their identity and culture within the context of the natural biome of the vast and diverse Amazon rainforest (Gama et al. 2018).

The Amazon, a geographical region capturing global attention beyond political boundaries, is renowned for its immensity, environmental wealth, biodiversity, and its vital role in maintaining the planet's environmental balance. The region was conceptualized by Moreira (1960) from three different perspectives, namely, a hydrographic basin, referring to a river basin (Amazonian) that constitutes the largest drainage basin on the planet; a botanical concept in the face of the vast richness of its fauna and flora; and, finally, a political–economic concept, as it constitutes an area that integrates the northern region of Brazil (and other neighboring countries) and, given the exuberance of its landscapes, is the region of greatest geographical interest in the country (Moreira 1960).

Considering the situation of geographic vulnerability, the region becomes of interest for the field of study that interconnects the themes of digital governance and access to justice. The objective is to verify whether the implementation of new technological solutions in the judiciary can contribute to access for people who live in regions far from physical judicial courts. It is also important to analyze whether the use of new technologies would be able to mitigate social inequalities, especially in access to justice (Omari 2018). Therefore, it is important to analyze the possible barriers and potential in this context.

Investigating the riverside population's perception regarding the intricacies of access to digital justice is thus imperative for enhancing their living conditions. Progress in this field of study seeks to safeguard not only the individuals themselves, but also the cultural context and biodiversity of the Amazon—a geographical region of global significance. As the most geographically intriguing place in the country, the Amazon has contributed elements of well-being crucial to the planet's balance and very survival (Lira and Chaves 2016).

3. The Context of the Riverside Population of the Brazilian Amazon and the City of Porto de Moz, Pará, Brazil: Data Collection and Participant Observation

To scrutinize the context of the local population of Porto de Moz, Pará, Brazil, we conducted documentary research, coupled with participant observation, to procure data about the region and its inhabitants.

Arrival at the Boca do Una community takes place by boat, as shown in Figure 1.

Figure 1. A photograph of the arrival at the Boca do Una community in the municipality of Porto de Moz. Source: authors' personal archive.

The data collection transpired during our involvement in the "Itinerant Citizenship" initiative, carried out in the riverside communities of the Pará Amazon, specifically, Itapéua and Boca do Una, both of which are situated within the jurisdiction of Porto de Moz, Pará. This initiative was orchestrated under the guidance of the local judge and unfolded on 22 and 23 March 2023. Throughout the research period, the researchers were aboard a UBS boat—the municipal basic health unit—made available through a collaborative effort between the judiciary and the local city hall. The boat was the means used by the "Itinerant Citizenship" action to enable those involved to reach out to the riverside populations, as shown in Figure 2.

The municipality of Porto de Moz is situated in the north-central region of the state of Pará, positioned at the heart of the Brazilian Amazon, as shown in Figure 3. The different colors show the different municipalities.

Figure 2. A photograph depicting the primary access route for the local population of Boca do Una to the "Itinerant Citizenship" initiative, showcasing the boats of the community members. In the background, the UBS boat, utilized by the researchers for accommodation, is visible. Source: authors' personal archive.

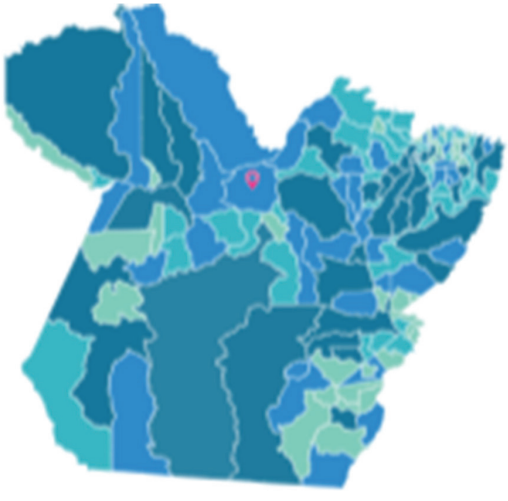

Figure 3. Map depicting the state of Pará, illustrating municipal divisions and pinpointing Porto de Moz. Source: IBGE website featuring the results of the latest demographic census (Instituto Brasileiro de Geografia e Estatística 2023).

A striking 82% of Porto de Moz's territory falls within the Verde para Sempre extractive reserve, recognized as a Brazilian conservation unit dedicated to the sustainable utilization of nature. According to the latest census conducted by the IBGE in 2022, Porto de Moz is home to a population of 40,597 inhabitants, boasting a population density of 2.33 individuals per square kilometer and encompassing a vast territorial expanse of 17,423.017 km^2. The data also reveal that in 2020, the employed percentage of the population was 6.4%, and the average salary for formal workers in the same year stood at BRL 1.9 minimum wage. The IBGE defines the employed population as the portion of the population that, in a given reference period, worked under a formal employment contract (Instituto Brasileiro de Geografia e Estatística 2023).

Official data on the IBGE website regarding the specific use of technology by the riverside populations of the Amazon is currently unavailable. However, information on the Brazilian population at large, especially internet usage, indicates that 90% of households in the country had internet access in 2021, marking a six percentage-point increase from 2019 (Instituto Brasileiro de Geografia e Estatística 2022). Consequently, the absence of dedicated data hinders our ability to conclusively determine whether a situation of digital exclusion exists in the riverside communities of the Amazon region. On the other hand, it remains uncertain whether the adoption of new technological solutions could serve as a means to redress social inequalities concerning access to justice and rights for individuals and groups facing geographical vulnerabilities despite the considerable physical challenges associated with such access.

Hence, it becomes imperative to investigate whether and how digital governance in the judiciary might contribute to enhancing access to justice for the riverside population, as well as indicating barriers and possibilities. Recognizing the relevance of local jurisdictional perspectives in shaping judicial policies, we employed the methodology of participant observation and qualitative research. This approach aims to yield diagnoses and proposals, enabling the development of research and tools that can effectively facilitate access to justice and rights for the riverside communities in the Amazon.

4. The Local Population's Perception of Access to Digital Justice in Porto De Moz

The recent and significant digital transformation within the judiciary has positively impacted the performance of judicial services (Conselho Nacional de Justiça 2022). Investigating how digital governance can enhance access to justice for those facing social vulnerability due to geographical constraints is crucial for addressing social and regional inequalities, as well as for improving the well-being of the local population.

This segment of the research aims to address the following questions: What is the impact of geographical barriers on access to justice in the Amazon region? Considering accessibility constructs and the available resources and structures, what are the facilities or obstacles determined by information and communication technologies? The objective is to observe the context and analyze the perceptions of residents in Amazonian riverside communities concerning the potential and barriers related to the use of communication and information technologies for access to justice and rights. Based on the results observed, diagnoses and proposals can be presented to promote research into improving this access, consistent with the local reality.

4.1. Methodology Employed in the Interviews

Informed by theoretical approaches to digital governance and supported by constructs of judicial governance and new public governance, the research aimed to identify the perceptions of residents of riverside communities in the Brazilian Amazon on two major issues: (i) whether the long distance to the justice building and other public offices would be a significant barrier to access to justice and rights; (ii) whether the use of information and communication technology by the judiciary could improve access to judicial services.

To address these questions, we employed participant observation and qualitative empirical (field) research methods involving the researcher's immersion in the investigated field (Gustin et al. 2020). The spatial focus was on the riverside communities of Itapéua and Boca do Una, situated on the banks of the Jaurucu River and belonging to the District of Porto de Moz, Pará.

The research team conducted interviews from 22 to 23 March 2023, during an action carried out by the "Itinerant Justice" initiative of the judiciary of the District of Porto de Moz, Pará.

The event called "Itinerant Citizenship Action" ("Ação Cidadania Itinerante") was an initiative developed by the judge of the District of Porto de Moz/PA. The objective was the provision of social services to the riverside population. An agreement was signed with the municipality to make a boat available so that people involved in providing services

could travel to the regions to be served and have accommodation and food during the week of services. Around 30 people gathered to work on services related to issuing civil and electoral documents and providing judicial services and legal assistance in the areas of conflicts, family, social security, and civil law, in addition to other social services, such as vaccinations and haircuts.

The researchers were invited by the organizers of the action to learn about the researched region and develop the research.

Ten individuals, who were randomly selected among the residents who participated in the "Itinerant Justice" initiative to receive services, were interviewed, ensuring diversity in gender, profession, age, education, and social influence in the local communities. The people interviewed were teachers and community agents, as well as men and women of different ages, rural workers, or those who did not perform any type of work.

A questionnaire, aligned with the theoretical constructs of digital justice and access to justice for vulnerable groups in geographical terms, was prepared in advance and administered to each respondent after obtaining their informed consent. The questionnaire covered several aspects, and the participants were asked the following questions: Have you ever sought a justice service or had the need to seek one? How was your experience with the justice service in solving your problem? What were the positive and negative aspects of the interaction? How could technology/digital justice help or hinder access to justice services? Do you have a computer or a mobile device that you can use to access justice services? What about access to the internet? Do you believe that the community having a computer or mobile device (smartphone) equipped with an internet connection could facilitate your access to justice? What kinds of information/instructions would you like to have to be able to seek justice and obtain your rights? What do you think about the possibility of submitting a request to the courts and participating in virtual/telepresence hearings without having to go to the courthouse? What is your opinion about the justice system getting closer to where you live through digital means? In your opinion, how could the use of technology, through access to justice by virtual means—submitting petitions and participating in virtual hearings (via electronic device and the internet)—increase or reduce the time/delay of the process? To conclude the interview, the questionnaire included some personal questions (What is your age? What is your level of education? What languages do you speak? What do you do for a living? What is your approximate income—or do you not work? What is the name of the city and neighborhood where you live?).

Respecting the ethical commitment to ensure anonymity, the respondents are presented in the body of the text using a denomination system: E1, E2, etc. The indicated number corresponds to the sequential number of the respondent, without identifying their name or personal characteristics at the time of the interview, which could identify them.

4.2. Analysis and Discussion of Results

Following the interviews with residents of the Itapéua and Boca do Una communities in Porto de Moz, Pará, the gathered data underwent analysis using the content analysis technique recommended by Bardin (2020). The objective was to transform raw results into meaningful and valid insights, enabling the creation of result tables, diagrams, figures, and models to emphasize the information extracted from the analysis (Bardin 2020).

Thus, we sought to categorize the content of the interviews into dimensions, as well as relating them to the theoretical constructs of digital governance in the judiciary and access to justice.

Utilizing ATLAS.ti software (Desktop version 23), five dimensions were constructed for digital governance and access to justice by riverside communities in the Amazon Region. These dimensions were derived from the content grouping in interviews, namely, (1) one's experience with justice, (2) access to information, (3) geographical barriers, (4) user-friendliness of technology, and (5) resources and infrastructure supporting technology use.

Initially, eight dimensions were found, including all five mentioned above and three others: communication and understanding of one's rights; limited awareness about tech-

nology usage; and the precariousness of internet access. However, these last three were disregarded at this time, because they were barely mentioned in the content of the interviews, and there was not enough scientific evidence. In relation to these three, future research is suggested.

Figure 4 identifies the five dimensions found in the interviews, according to the content analysis, presenting a possible correlation between them and digital governance and access to justice.

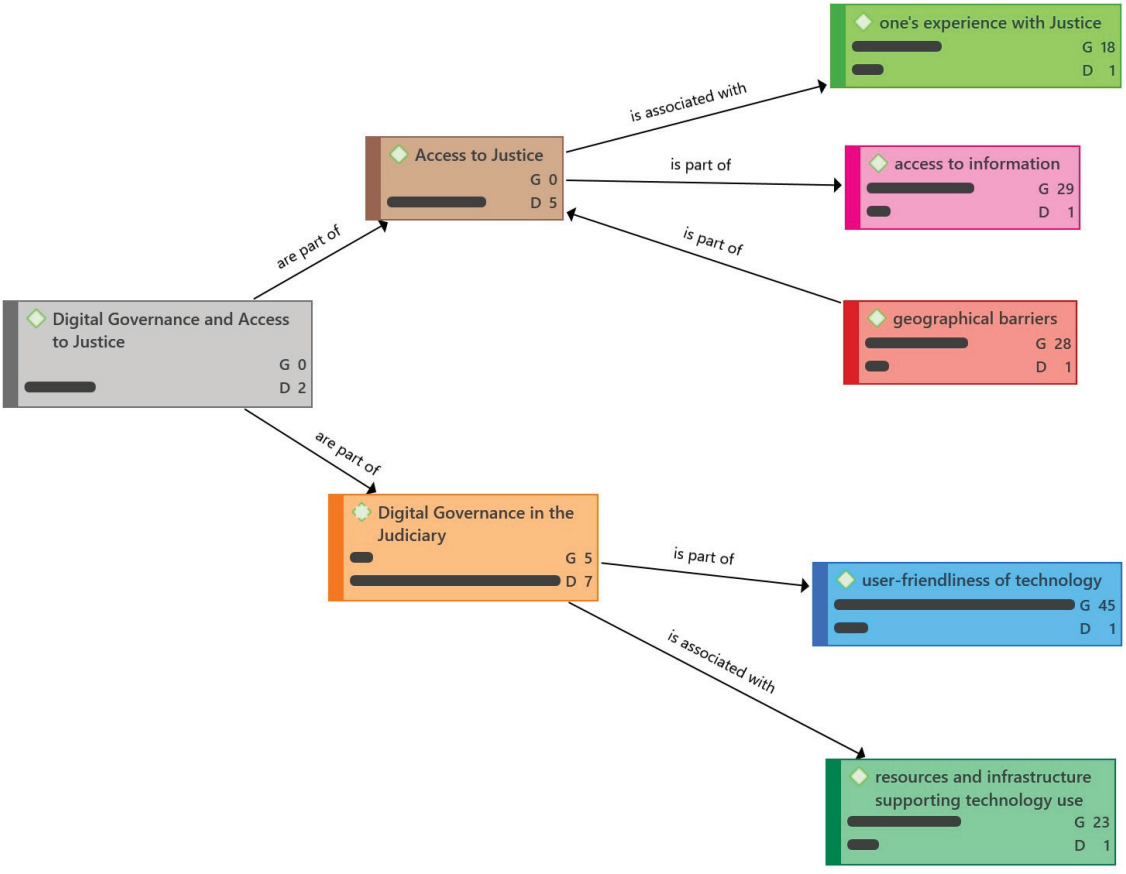

Figure 4. Dimensions for digital governance in the judiciary and access to justice for riverside communities. Source: table compiled by the authors based on the results obtained from analyzing the interview data in ATLAS.ti.

The expression "is part of" is used to indicate a greater degree of influence on the relationship between the dimensions, and the expression "is associated with" is used to indicate that the relationship between the constructs exists, but the influence between them is reduced. The attributions of each of these relationships considered the frequencies mentioned in the interviews, as indicated in the figure presented ("G").

The dimensions **access to information** and **geographic barriers** were the most indicated by the interviewees as influential in **access to justice**, which may indicate that the adoption of measures aimed at reaching digital justice to those under jurisdiction, with due information regarding its use, may constitute increases in access to digital services. **Access to information** was used to indicate the availability to interviewees of the information necessary for access to justice and rights, while **geographic barriers** were used to indicate

the difficulties in the physical path existing to reach the current physical structures of the forums. **Experience with justice** is explained as the prior use of judicial services when conducting interviews and the communication and understanding of rights in terms of the possibility of people understanding the rights they have and being able to express themselves in order to achieve them.

In the aspect of **digital governance in the judiciary**, two dimensions stood out in terms of the importance indicated by the interviewees, namely, the **user-friendliness of technology** for achieving rights and the **resources and infrastructure supporting technology use**. As for the first, it indicates whether technology can constitute a skillful instrument for improving access to justice in Brazil, while the second indicates how many resources and structure already exist in the researched regions for people to use. We sought to diagnose with these two dimensions, therefore, to determine how much technology already exists in the researched regions and whether this technology can contribute to improving access to judicial services.

The five dimensions found in the interviews certainly do not constitute a complete and closed list regarding the use of new technologies to increase judicial services. They are indicators that can be used in new investigations about access to justice and digital justice.

Based on these five dimensions, we began to discuss the results and contents of the interviews.

Initially, the analysis revealed that the natural **geographical barriers** in the Amazon region significantly impact access to justice for riverside communities. Indeed, residents in these communities reported having to endure riverboat journeys lasting between eight to twelve hours to reach the only courthouse in the judicial district located in Porto de Moz, Pará. All the respondents conveyed the challenges of securing resources and arrangements for this travel, involving substantial time and financial commitments.

For instance, E1 highlighted the following:

> "[. . .] [. . .] We live along the Jaurucu River, specifically in the Itapéua community. Although the straight-line distance is 97 miles, the river's numerous bends extend the journey to a full day, sometimes even longer. Unfortunately, we lack [. . .]. The boat trip typically spans 12 h, depending on the type of boat we use [. . .]".

E2 reported the following:

> "[. . .] [. . .] It's a pretty big distance for us to cover [. . .]. Usually, we only make the trip to Porto de Moz if it's a really important case [. . .]. Besides the time it takes, there's also the cost since we have to stay overnight [. . .]".

E4 reported the following:

> "[. . .] [. . .] It's about 86 miles to get to the city. Taking a boat means a whole day of travel. We rent a boat, and if it's just one passenger, the round trip can set you back around 800 reais. Trying to pull off a day trip isn't practical; we must stay overnight. We end up spending the night on the boat. Sometimes, I crash at a friend's place or grab a studio [. . .]".

In the same vein, E6 explained the following:

> "[. . .] [. . .] Imagine clocking in a 12-h boat ride just to get to the city. If we needed to do that today, we'd be looking at a late-night arrival and then dedicating the whole next day to sorting things out. These are the hurdles we have to deal with [. . .]".

The presence of such a formidable **geographical barrier**, as conveyed by the interviewees, poses a significant hindrance to individuals seeking access to justice and their rights. This challenge is particularly pronounced due to time constraints and financial limitations, which impede their ability to reach the courts. The decision to have just one physical location for accessing the Porto de Moz judiciary and other judicial services, including the issuance of civil documents, exacerbates the difficulty citizens face in realizing their rights. They must invest a considerable amount of time in the journey, coordinate community

members to secure a boat for transportation to the urban center of the municipality, and secure financial resources for both transportation and the necessary overnight stay. The option of returning on the same day as the outbound journey is virtually non-existent.

However, examining the elements of accessibility, resources, and the structure integral to judicial governance, as outlined by Akutsu and Guimarães (2015), and considering the principles of digital governance in the judiciary, the interviewees strongly emphasized that information and communication technologies have the potential to facilitate access to justice and rights in the Amazon region. However, in some instances, a lack of familiarity with technology remains a feasible challenge.

In this regard, E10 expressed, "[. . .] I think it's good that we can do this over the Internet, even more because of what I'm saying. Sometimes we can't afford to go there. But if we don't, things get complicated. It's quite expensive. So, I think it would be very good [. . .]".

E9, on the other hand, underscored the importance of the possibility of attending appointments scheduled by the court, stating:

> [. . .] [. . .] When an opportunity like this comes along, we have to be able to go there. If we can't afford it, we're going to miss the date. And things get more complicated for us. So, I think this way of doing it online would be more [. . .]. Sometimes, they can set a date for a hearing, and you can't get there. Yeah, you miss the date [. . .].

Despite some respondents indicating that **resources and infrastructure** for utilizing technology were lacking, such as outdated equipment or slow internet speed, and acknowledging a knowledge gap, the adaptation of digital governance and technology by the judiciary, tailored to regional nuances, can potentially enhance access to justice. This implies that digital governance functions more as a conduit to access institutions responsible for realizing rights rather than fostering social or digital exclusion.

E1 highlighted:

> [. . .] "[. . .] People who live nearby, who can't access the internet, always come to us [. . .]. So, when they need something, guidance, someone always helps them [. . .]. Also, because many of them have a low level of education. So, access for them is difficult. Then, we ask the people in Porto de Moz for guidance or someone else. A secretary, coordinator, or supervisor. These people are better informed [. . .]".

In this respect, E3 stated: "[. . .] if justice came by mobile phone, do you think you'd be able to access justice services on your own? I think so. I don't think it would be so easy, but it would be good to have another person help me out".

Based on the observed context and participant perceptions, it was concluded that the internet and digital devices, such as computers and mobile phones, can effectively extend the reach of the justice system to the remote regions of the Brazilian Amazon, integrating its residents into the social fabric of rights realization. Although the riverside population possesses some level of access and knowledge of technological resources and is aware of certain rights, the context remains precarious. Hence, the presence of justice, supported by both human and technological resources, is crucial for empowering the riverside population with more information about their rights, thereby enabling them to exercise these rights.

For instance, central actions could be implemented to equip the community school with information and communication technology resources and infrastructure, complemented by the training of local community agents. This approach would allow the local population to access information and justice without the need for extensive physical travel. Actions such as public education on access to rights and the use of technology could better prepare the riverside population to achieve rights, especially due to the difficulties faced by geographic barriers.

Indeed, E8 emphasized, "[. . .] with this little computer there, we'd have the time to work during the day and at night to access, understand and search for this information [. . .]".

While lacking a computer at home, E10 stated, "[. . .] my cell phone doesn't have internet access because we don't have internet here. But whenever I come to Porto de Moz, I access the internet [. . .]".

Therefore, digital governance in the judiciary of the Brazilian Amazon region, aligned with the principles of new public governance, emerges as a viable alternative to enhance access to information and public services. It fosters ease and speed of interaction while reducing transaction costs between citizens and government authorities, including the judiciary. This approach forms an integral part of a judicial policy that authentically addresses local realities (Maia and Correia 2022a).

The implementation of digital justice could revolutionize access to justice and rights for the riverside population, eliminating the need for extensive travel to the singular physical structure of the judiciary in a given region. A digital governance model in the judiciary could redefine access by introducing a new organizational design that aligns with regional contexts.

Geographical barriers constitute an obstacle to access to justice. The research indicates that there is the possibility of alleviating this restriction with the implementation of technology that facilitates the achievement of rights, as well as the provision of information by people trained for this purpose.

Through exploring the local context and understanding the perspectives of riverside community residents, it is evident that digital governance and the application of new technologies by the judiciary, tailored to regional contexts, can effectively streamline access to justice services. This has the potential to alleviate geographical and social barriers, empowering individuals to realize their fundamental rights and ultimately contributing to the reduction of social and regional inequalities.

5. Conclusions

Digital governance within the judiciary has positively impacted the enhancement of judicial services, introducing fresh avenues for conflict resolution. However, investigating how digital governance can amplify access to justice for those facing geographical constraints becomes imperative in addressing social inequalities and elevating the quality of life in Brazil, given its vast territorial dimensions.

Understanding the context, lifestyles, and challenges confronted by individuals and groups experiencing geographical vulnerability is pivotal. This comprehension, rooted in the realities of life and the opportunities presented by digital governance, enables the creation of alternatives that influence the organizational framework of justice. The goal is to diminish prevailing geographical obstacles to justice access, actualize fundamental rights, and, consequently, mitigate social and regional disparities. Empirical research, such as that conducted herein, contributes to this diagnostic process, ensuring that new technologies are leveraged positively, avoiding any exacerbation of digital exclusion.

Through participant observation and interviews conducted in two riverside communities situated in the Amazon region of Pará and leveraging content analysis with the assistance of ATLAS.ti, this study established five dimensions for digital governance and access to justice in Amazonian communities. These dimensions encompass (1) one's experience with justice, (2) access to information, (3) geographical barriers, (4) user-friendliness of technology for accessing justice services and rights, and (5) resources and infrastructure supporting technology use.

The qualitative research, particularly through participant observation, underscored the significant challenge posed by geographical barriers for riverside communities seeking access to justice and basic rights. The necessity to navigate rivers for eight to twelve hours to reach the judicial District of Porto de Moz, Pará, remains a prominent obstacle. Consequently, residents advocate for the implementation of technology by the courts

in these communities, anticipating that it would not only broaden access to justice but also necessitate the dissemination of information on rights by the judicial system and other stakeholders.

In scrutinizing the local context and analyzing the perspectives of riverside community residents, we infer that digital governance and the transformative impact of technology within the judiciary, attuned to regional nuances, can potentially ease access to justice. This approach has the potential to alleviate both geographical and social barriers that hinder the realization of fundamental rights. Therefore, it is suggested that new research be carried out in other regions and with other communities in order to support public policies.

Proposing a future research agenda, we recommend exploring the perceptions of justice system stakeholders concerning digital governance within the judiciary and access to justice. Additionally, extending this investigation to encompass the perspectives of individuals and groups facing geographical vulnerability in other regions and contexts across the country could facilitate a comprehensive comparative analysis.

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Article

Best Practices for Municipalities to Promote Online Citizen Participation and Engagement on Facebook: A Narrative Review of the Literature

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Abstract: The objective of this study is to identify the best practices of Facebook use for municipalities looking to communicate and interact with their citizens, with a particular impact for rural municipalities. A narrative review was conducted to identify the scientific and gray literature on research databases and Google, respectively. A thematic analysis of the data was conducted to summarize the main strengths, challenges, and recommendations to improve municipalities' Facebook use. Our results showed many benefits of Facebook use for municipalities and elected officials, such as communicating efficiently with citizens. The main challenge identified was developing an effective communication strategy. Finally, several recommendations were found, such as making Facebook posts that appeal to citizens and promote discussion. These results will be useful in helping municipalities develop an effective Facebook communication strategy to improve online engagement and citizen participation for local governments.

Keywords: engagement; participation; social networking sites; municipalities; Facebook

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1. Introduction

The first social networking sites appeared over two decades ago (Boyd and Ellison 2007). Today, over 90% of Canadians aged 15 to 34 years use social media regularly (Schimmele et al. 2021) to keep up with family and friends, follow current events, and share content both privately and publicly (Schimmele et al. 2021). One benefit of these sites from a public health perspective is that they can promote social participation (Ellison et al. 2007).

Despite substantial growth in user numbers on platforms such as TikTok, Reddit, and Twitch, Facebook remains the most popular social networking site in Canada as of 2022. An impressive 80% of online Canadian adults report having a Facebook account, and the platform boasts the highest percentage of daily users, standing at 70% (Mai and Gruzd 2022). Facebook allows individuals and organizations to interact with each other and share information which can then be read, seen, or commented on (Magnusson et al. 2012), promoting participation, openness, conversation, engagement, and connectivity between users (Haro-De-Rosario et al. 2018; Lappas et al. 2022). Organizations can therefore use Facebook to disseminate information, initiate discussions, gather feedback, and bring their page's followers together (Magnusson et al. 2012). Facebook is also affordable and allows a large amount of information to be disseminated in real time to a wide audience, across several social groups (Bonsón et al. 2019). For example, Facebook can be used to communicate with people living in rural areas who are harder to reach than those living

closer to city centers, where the majority of public services, including healthcare, are usually offered (Flood-Grady et al. 2020). Rural areas can be defined in two ways: (1) Towns or municipalities outside the commuting zone of larger urban centers, defined as a center with a population of 10,000 or more, or (2) a city, town, or village with less than 150 persons per square kilometer (Alberta Urban Municipality Association & Alberta Association of Municipal District and Counties 2015).

Over the past decade, an increasing number of public administration bodies, including municipalities, have reported using Facebook to communicate and interact with citizens (Bonsón et al. 2019; Agostino 2013). For example, the number of municipalities in the province of Ontario (Canada) with a Facebook account increased by 672% over two years, with 25 municipalities present on the social networking site in 2010 compared to 193 in 2012 (Lambie and Michaluk 2012). In addition to its ability to spread information, Facebook plays a central role in the local information infrastructure, supplanting local news media (Guo and Sun 2022; Thorson et al. 2020). The platform also allows municipalities to know their citizens "personally" by establishing a dialogue with different audiences (Bonsón et al. 2017). This has many benefits for municipalities, such as making it easier to obtain citizens' reactions, ideas, and opinions, which makes it possible to solve problems, improve public services, or encourage citizens to take specific actions (Bonsón et al. 2017). For example, during the COVID-19 pandemic, Facebook was used to communicate sanitary restrictions and recommendations (e.g., physical distancing measures) to citizens in many countries, such as the United States, England, and Singapore (Tan et al. 2021). It was also used in Poland to foster community building and engagement (e.g., encouraging citizens to help people in need) (Górska et al. 2022). Facebook can also help citizens learn about projects in their municipality and reinforce their social and political engagement (Bonsón et al. 2017; Faber 2022). However, many municipalities are reluctant to use this social networking site due to a lack of human and financial resources or a lack of knowledge (FuturoCité 2017).

Two previous reviews of the literature examined the use of social networking sites in governance and in politics. The first examined the use of social networking sites at the state and local levels (regional, county, and municipal governments), reporting that these governments use social media to spread messages regarding public safety (e.g., incidents, weather emergencies), transportation (e.g., road safety, traffic issues), and infrastructure and environmental management (e.g., infrastructure repairs and maintenance, noise pollution) (Perlman 2012). Another review explained how social media can be used by political actors, such as politicians and political parties, to encourage political participation and engagement (Ben Mansour 2017). Politicians can use social media to interact with citizens and present a personable political image, giving the impression that they are in touch with the population and its needs (Ben Mansour 2017). Two other systematic reviews explored related issues. The first systematic review examined the literature on barriers to citizens' online participation and identified the following as challenges: digital illiteracy, Internet accessibility issues, lack of interest in political matters or public affairs, low levels of confidence in politicians, unclear content, privacy issues, lack of transparency, and lurking behavior (i.e., observing the posts of an online community but not participating) (Oliveira and Garcia 2019). The second systematic review conducted a meta-analysis on the link between social media use and citizen engagement and found that social media use was positively associated with citizen engagement, specifically social capital (e.g., bonding), civic engagement (e.g., volunteering), and political participation (e.g., voting) (Skoric et al. 2016).

These four reviews provide relevant information on how various social media can be used to promote citizen participation and engagement, especially during elections. They leave room for the present review for at least four reasons. First, none of them examined Facebook exclusively, and it was the most widely used social networking site in the world in 2021 (Tankovska 2021), including in Canada (Gruzd and Mai 2020). Second, none focused specifically on municipalities, though Facebook can be especially useful for reaching people in rural areas (Flood-Grady et al. 2020). Third, most reviews only included scientific articles,

while the gray literature (municipal and organizational documents, websites, newspaper articles) offers data on how small and large municipalities use Facebook to communicate with their citizens, the strengths and challenges of using this social networking site, and how to improve its use to promote online citizen participation and engagement. The meta-analysis on social media use and citizen engagement included dissertations and theses in addition to scientific articles (Skoric et al. 2016), but no gray literature. Fourth and finally, the most recent review was published in 2019 and included articles published until 14 September 2018 (Oliveira and Garcia 2019). It was thus conducted prior to the COVID-19 pandemic, which has had an impact on governments' social media use (Tsao et al. 2021) and may have encouraged more municipalities to use Facebook to communicate with their citizens (Tan et al. 2021).

To our knowledge, no review has yet been conducted on Facebook use by rural municipalities or its strengths, challenges, and best practices. This review aimed to fill this gap by reviewing the available scientific and gray literature.

2. Objectives

This study aimed to provide an overview of best practices related to the use of Facebook by municipalities. Specifically, the objectives were the following: (1) to identify the strengths and challenges of online citizen participation and engagement on municipal Facebook pages; and (2) to document rural municipalities' best practices for using Facebook to communicate with citizens and promote online citizen participation. The overarching goal was to enhance support for municipalities, with a particular focus on rural areas, in refining their communication practices through this social network.

3. Methods

3.1. Design

A narrative review was chosen for its ability to document new and emerging practices and to summarize all types of evidence, including gray literature (Baethge 2019). Narrative reviews address a specific research question and provide a summary of the included studies, without a systematic literature search (Baethge 2019). The Narrative Review Article Rating Scale checklist was used to guide this study (Baethge 2019). In the Results section, selected documents are indicated by their corresponding number (in parentheses), for the sake of clarity and concision. Bibliographic information on these documents, along with their corresponding numbers, can be found in Supplementary Material S1.

3.2. Search Strategy

The review was conducted in two parts. The first aimed to identify articles from the scientific literature published in databases (MEDLINE/PubMed, Web of Science, Érudit, and Google Scholar). The following keywords and their synonyms were used to search each database: "Facebook", "social network", "municipalities", and "online citizen participation and engagement". Synonyms included "public participation", "public engagement", "political participation", "civic engagement", "participatory democracy", "stakeholder involvement", "co-creation", and "activism" (Bonsón et al. 2019). For the purposes of our study, we define online citizen participation and engagement as the process of citizens voluntarily engaging in dialogue with municipalities on policy, decision making, and service design and delivery on Facebook to improve municipal life, services, or resources in a participatory, inclusive, and deliberative manner (Bracht 1991; United Nations 2014; World Bank 2016). For example, online citizen participation and engagement could take the form of citizens participating in discussions with municipalities in Facebook groups or forums on matters related to municipal management (e.g., elections and new regulations) or engaging in online interactions (e.g., commenting, sharing) with municipalities via Facebook on public issues. The second part aimed to identify relevant gray literature (research reports, municipal and organizational documents, websites, newspaper articles) and was carried out in Google using the exact same keywords.

3.3. Inclusion and Exclusion Criteria

Documents published between 2011 and 2021 were selected to include only articles published in the past ten years (at the time the literature search was conducted in 2021) and to cover the COVID-19 pandemic, which has had an impact on social media use. To be included in the review, the documents had to (1) explore the benefits and challenges of online citizen participation and engagement on municipal Facebook pages and (2) document best practices to promote online citizen participation and engagement on Facebook. Documents specifically addressing the use of social networks other than Facebook (e.g., Twitter, Instagram) were excluded, as these platforms are less commonly used by municipalities. To ensure that the data could be relevant to rural municipalities, documents addressing Facebook use by federal and provincial governments were excluded from the review, as these governments may have access to greater resources and their preoccupations may vary considerably from those of municipalities, especially small rural ones.

3.4. Data Extraction and Analysis

Data from the reviewed documents were extracted and analyzed using thematic analysis to qualitatively summarize the main benefits and challenges, as well as the authors' recommendations for municipalities using Facebook to communicate with their citizens and to promote online citizen participation and engagement. The process began with immersion in the data, where a researcher (LB) familiarized herself with the narrative content of the included studies. This involved multiple readings to gain a profound understanding of context, concepts, and content (Braun and Clarke 2006; Vaismoradi et al. 2013).

A data extraction form was then developed to extract the most relevant information from the documents included in the review (copied and pasted without reformulation). Data extracted covered the following themes: characteristics of the document (authors, title, year, and country), the objective of the document, the benefits and challenges of Facebook use by municipalities, and recommendations for optimal Facebook use to promote online citizen participation and engagement. The extracted data were then subjected to a thorough review to assess their relevance and significance to the study objectives, and coding was refined and adjusted as needed. Once reviewed, the same researcher (LB) proceeded to define each theme clearly, ensuring themes were distinct yet comprehensive in capturing the essence of the extracted data. A consensus was then reached with the research team on the themes and the coding. Finally, the analysis culminated in the drafting of the study, where the identified themes were presented in a coherent narrative. This narrative was structured logically and supported by illustrative quotes from the reviewed materials, offering insights and implications in the context of the overarching research question and objectives.

4. Results

4.1. Documents Included

A total of 35 documents were included in this review, with 20 articles from the scientific literature (57%) and 15 from the gray literature (43%) (see Table 1 for the descriptive characteristics of the documents included and Supplementary Material S1 for a list of the documents included in the review). The gray literature included four methodological guides, four municipal policies, four websites, two newspaper articles, and one research report. All documents were published between 2011 and 2021, though the year of publication was not available for one document. Most documents were from Canada (28.6%), the United States (14.3%), and Spain (14.3%). The presence of several documents from Canada underlines the pivotal role citizens play in this country in its decision-making processes (Mendell 2006) and the growing interest in online citizen and stakeholder engagement in recent years (Longo 2017). All other documents came from other European countries (9 documents), the Middle East (4 documents), Turkey (1 document), or South Africa (1 document). Results were organized according to three main themes: (1) Benefits associated

with municipalities' Facebook use, (2) Challenges associated with municipalities' Facebook use, and (3) Recommendations to improve municipalities' Facebook use.

Table 1. Descriptive characteristics of documents included in the review.

Characteristics		Number of Documents	Percentage
Type of document	Scientific articles	20	57.14
	Methodological guides	4	11.43
	Municipal policies	4	11.43
	Websites	4	11.43
	Newspaper articles	2	5.71
	Research reports	1	2.86
	Total	35	100
Year of publication	2011	1	2.86
	2012	1	2.86
	2013	1	2.86
	2014	1	2.86
	2015	5	14.29
	2016	2	5.71
	2017	9	25.71
	2018	6	17.14
	2019	3	8.57
	2020	4	11.43
	2021	1	2.86
	Information not available	1	2.86
	Total	35	100
Country	Canada	10	28.57
	United States	5	14.29
	Spain	5	14.29
	Jordan	2	5.71
	Italy	2	5.71
	Sultanate of Oman	1	2.86
	Turkey	1	2.86
	Israel	1	2.86
	South Africa	1	2.86
	Germany	1	2.86
	Belgium	1	2.86
	Greece	1	2.86
	Netherlands	1	2.86
	Portugal	1	2.86
	Sweden	1	2.86
	Denmark	1	2.86
	Total	35	100

4.2. Benefits Associated with Municipalities' Facebook Use

The benefits of municipalities' Facebook use impact not only municipalities but also elected officials and citizens. The main benefits include promoting citizen participation and engagement in public affairs, improving electoral participation, fostering communication and a close link with citizens and stakeholders for both municipalities and elected officials, increasing visibility for elected officials and the municipality, enhancing citizens' sense of democracy and empowerment, and contributing to community development and citizens' sense of closeness and belonging to their municipality.

4.2.1. Benefits for Municipalities

Benefits of Facebook use for municipalities include promoting citizen and stakeholder participation and engagement, increasing efficiency of communications, establishing municipal brand image, and supporting the development of the local community and services.

Promoting citizen and stakeholder participation and engagement: Facebook use allows municipalities to listen to citizens' opinions and concerns (see documents 19, 21, 23, 25 in Supplementary Material S1); to engage with citizens and obtain measurable feedback on ideas, programs, services, and regulations (see documents 13, 15, 21, 23, 24, 25, 30 in Supplementary Material S1); and to encourage citizens and stakeholders to take specific actions, such as participate in social events or discussion forums (see documents 14, 21, 24 in Supplementary Material S1). In addition, Facebook use favors the participation of citizens with lower income (see documents 8, 17 in Supplementary Material S1).

Increasing efficiency of communications: It improves municipal communications and relations with citizens and stakeholders (see documents 4, 17, 19, 24 in Supplementary Material S1) and allows municipalities to share information to a wide audience within and beyond the municipality (see documents 1, 2, 5, 10, 13, 15, 19, 21, 23, 24, 25, 27, 30 in Supplementary Material S1), easily reaching specific audiences on specific topics (see documents 21, 30 in Supplementary Material S1). It bolsters the municipality's transparency, openness, and accountability (see documents 1, 2, 4, 19, 24 in Supplementary Material S1). In addition, Facebook serves as a means to communicate quickly in emergency situations (see 2, 21, 23, 24, 26, 27, 28, 30 in Supplementary Material S1), present complex ideas and questions clearly and simply (see document 21 in Supplementary Material S1), share information and combat disinformation (see documents 21, 28, 31 in Supplementary Material S1), and communicate at a low cost (see documents 1, 30 in Supplementary Material S1).

Establishing a brand image: Facebook allows municipalities to build a positive reputation and humanize their organizations (see documents 13, 21 Supplementary Material S1), to promote municipal activities, facilities, and events to tourists at low cost (see documents 2, 3, 5, 21, 24, 25, 26, 28 in Supplementary Material S1), and to symbolize modernity and dynamism (see documents 5, 25, 30 in Supplementary Material S1).

Supporting the development of the local community and services: Municipalities benefit by fostering community through sharing stories, pictures, and local content (see document 21 in Supplementary Material S1), by promoting collaboration between different public organizations (e.g., sharing best practices) (see documents 2, 4 in Supplementary Material S1), and by improving the efficiency of local public services (see document 19 in Supplementary Material S1).

4.2.2. Benefits for Elected Officials

Benefits of Facebook use for elected officials include the ability to communicate efficiently, enhance their visibility and image, foster connections with citizens and stakeholders, and strengthen electoral participation.

Communicating efficiently: Elected officials can use Facebook to strengthen their credibility by sharing accurate, respectful, and professional information (see document 21 in Supplementary Material S1) and by demonstrating transparency in initiatives (see document 21 in Supplementary Material S1). Other benefits include the opportunity to test messages with citizens (e.g., campaign slogans) (see document 28 in Supplementary Material S1), a forum for participating in important local conversations (see document 21in Supplementary Material S1), and access to a large pool of people with diverse ideas, contributions, and experiences (see documents 21, 31 in Supplementary Material S1).

Enhancing elected officials' visibility and image: Facebook allows elected officials to promote themselves online (see documents 1, 31 in Supplementary Material S1) and build a personal brand image (see document 21 in Supplementary Material S1).

Fostering connections with citizens and stakeholders: The platform enables elected officials to establish direct, personal connections with citizens and stakeholders (see documents

21, 31 Supplementary Material S1), while providing a platform for hearing their concerns and ideas (see documents 21, 31 Supplementary Material S1) that allows officials to request feedback on their own ideas and decisions (see document 21 in Supplementary Material S1). It also helps strengthen participation in elections (see documents 1, 31 in Supplementary Material S1).

4.2.3. Benefits for Citizens

Benefits for citizens include learning about and participating in political social debates, feelings of closeness and belonging to the municipality, and a sense of democracy and capacity for action.

Learning about and participating in political and social debates: The platform allows citizens to take part in conversations without belonging to a public affairs elite (see documents 2, 21 in Supplementary Material S1) and to stay informed about political and social issues through quick, up-to-date information (see documents 2, 18, 20 in Supplementary Material S1). It also increases citizens' opportunities for participation and engagement in public affairs (see documents 1, 2, 4, 5, 6, 8, 15, 16, 18, 19, 23, 28 in Supplementary Material S1), fosters feelings that their knowledge and skills are being used to improve the quality of services (e.g., co-creation and evaluation of services) (see documents 2, 5, 11, 12, 18, 24 in Supplementary Material S1), and lets citizens participate in municipal conversations easily, accessibly, and intuitively (see documents 18, 20, 21, 23 in Supplementary Material S1).

Feelings of closeness and belonging to the municipality: It gives citizens a greater sense of closeness and belonging to the municipality through better dialogue, stronger relationships, and greater trust (see documents 1, 2, 4, 18, 19, 20, 24, 25, 28 in Supplementary Material S1).

A sense of democracy and capacity for action: It gives citizens a greater impression of taking part in democratic processes (see documents 4, 6, 16 in Supplementary Material S1) and empowers them (see documents 6, 20 in Supplementary Material S1).

4.3. Challenges Associated with Municipalities' Facebook Use

The main challenges municipalities encounter in using Facebook include creating posts that fail to encourage citizens' participation and engagement and a fear of negative comments from citizens. Municipalities also report a lack of human and financial resources to effectively manage their page and a lack of knowledge on how to encourage online citizen participation and engagement. Overall, these challenges for municipalities can be grouped into four categories: a deficient Facebook strategy, a reluctance to use Facebook, a reluctance to solicit participation and engagement on Facebook, and citizens' own reluctance to interact with municipalities on this platform.

4.3.1. Inadequate Facebook Strategy

Municipalities' strategies for this social network tend to fall short in that they include some fundamental errors in social media strategy and generally fail to provide engaging content.

Basic mistakes: These include prioritizing the number of followers or "likes" (see documents 1, 4, 5, 6, 30 in Supplementary Material S1), using municipal pages to promote the interests of municipal management (see documents 1, 3, 4, 10, 13, 24, 25 in Supplementary Material S1), a lack of marketing strategy for their page (see document 9 in Supplementary Material S1), maintaining an outdated page that generates little engagement (see documents 9, 14, 15 in Supplementary Material S1), not using the benefits of the site to their full potential (see documents 3, 14, 15 in Supplementary Material S1), and a lack of knowledge about how Facebook algorithms function (see document 38 in Supplementary Material S1).

A lack of engaging content: Municipal posts often fail to capture citizens' interest or encourage engagement (see documents 2, 6, 15 in Supplementary Material S1), using few images and videos (see documents 6, 8, 9, 10, 17 in Supplementary Material S1). Related problems include posting infrequently (see document 9 in Supplementary Material S1), posting low-quality content (see document 8 in Supplementary Material S1), posting at

non-optimal times of the day (see document 8 in Supplementary Material S1), neglecting to respond to citizens' comments (see document 9 in Supplementary Material S1), and posting about county or regional concerns or linking to websites (see document 9 in Supplementary Material S1).

4.3.2. Municipalities' Reluctance to Use Facebook

These challenges pertain to a lack of human and financial resources, undervaluing Facebook's utility for municipal communication, fear of negative comments and posts, a lack of knowledge of Facebook communication practices, and overestimating the time employees spend managing the account.

A lack of human and financial resources: This challenge manifests through a lack of qualified staff to run social networking sites (see documents 7, 19, 21, 23, 25, 30 in Supplementary Material S1) and disparities between small and large municipalities' budgets and resources (see documents 14, 17 in Supplementary Material S1).

Undervaluing Facebook's utility for municipal communication: This stems from the assumption that the social networking site is not a priority and that citizens would not be interested in participating and engaging through it (see documents 19, 21, 25, 30 in Supplementary Material S1) and decisions not to allocate communication resources to Facebook (see documents 1, 4, 5 in Supplementary Material S1).

Fear of negative comments and posts: This encompasses apprehension about receiving unfavorable or detrimental comments from both citizens and "trolls" (see documents 19, 21, 23, 31 in Supplementary Material S1) and fears that municipal employees or elected officials will make inadequate posts (see documents 23, 24, 25, 31 in Supplementary Material S1).

A lack of knowledge of Facebook communication practices: Some municipalities consider Facebook pages to have fewer advantages than websites (see documents 30, 31 in Supplementary Material S1), are unfamiliar with effective Facebook communication strategies (see documents 25, 30 in Supplementary Material S1) and regulations governing social networking sites (see documents 7, 21 in Supplementary Material S1), and struggle to comprehend the impact of a Facebook page (see documents 21, 23 in Supplementary Material S1).

Overestimating the time employees spend managing the account: There are concerns that municipal employees will dedicate excessive time to managing the page (see document 21 in Supplementary Material S1).

4.3.3. Municipalities' Reluctance to Solicit Citizen Participation and Engagement

This challenge includes concerns about citizens' use of Facebook, undervaluing innovation and citizen engagement, a lack of knowledge about online citizen participation, and difficulties faced by social media managers in establishing direct dialogue with citizens.

Concerns about citizens' use of Facebook: Concerns include that Facebook is not universally accessible (see document 7 in Supplementary Material S1) and that citizens would post inaccurate content (see documents 21, 23 in Supplementary Material S1).

Undervaluing innovation and citizen participation and engagement: This stems from an organizational culture or municipal leadership that underestimates the value of citizens' contributions (see documents 7, 13 in Supplementary Material S1), a lack of qualified employees and resources to engage with citizens on Facebook (see documents 7, 9 in Supplementary Material S1), undervaluing innovation and experimentation (see documents 6, 25 in Supplementary Material S1), undervaluing transparency and citizen involvement (see document 1 in Supplementary Material S1), and skepticism about the importance of social networking sites in fostering citizen engagement and participation (see document 19 in Supplementary Material S1).

Lack of knowledge about online citizen participation and engagement: Municipalities lack a clear strategy or guidelines on promoting online citizen participation and engagement (see documents 7, 16 in Supplementary Material S1) and interpretations of engagement and participation differ across municipalities (see document 19 in Supplementary Material S1).

Difficulties establishing direct dialogue with citizens: Social media managers experience tensions between their responsibilities and the possibilities social networking sites offer (see document 3 in Supplementary Material S1) and often lack direct relationships with key officials in the organization, which are necessary for optimal engagement (see document 16 in Supplementary Material S1).

4.3.4. Citizens' Reluctance to Interact with Municipalities on Facebook

An additional challenge to municipalities' Facebook use is citizens' own reluctance to interact with them on the platform, which includes limited intentions to actively participate on municipal Facebook pages, impressions of a one-way dialogue with municipalities, privacy concerns about the platform, and a lack of awareness of or access to municipal platforms.

Citizens' limited intention to participate on the platform: Citizens often merely "like" or read municipal posts, rather than interacting with them by commenting, sharing, or otherwise participating in the discussion (see documents 18, 20in Supplementary Material S1). Citizens' intention to engage with municipalities on Facebook is low, relative to their positive attitude towards the platform, perceived effectiveness of participation, and perceived control over their participation (see document 12 in Supplementary Material S1).

Citizens' impressions of a one-way dialogue with municipalities: Citizens express doubts about whether their contributions are considered in municipal decisions (see document 11 in Supplementary Material S1), perceptions of little dialogue with municipalities (see documents 18, 20 in Supplementary Material S1), and frustrations with the asynchronous communication on social networking sites (see document 20 in Supplementary Material S1).

Privacy concerns: These include worries about the public nature of the platform and individuals' privacy on social networking sites (see document 20 in Supplementary Material S1).

A lack of awareness or access to the municipal platforms: Some citizens are unaware of the existence of municipal platforms (see document 20 in Supplementary Material S1) or lack access to technology (e.g., cell phone, computer) or the Internet (see document 20 in Supplementary Material S1).

4.4. Recommendations to Improve Municipalities' Facebook Use

The documents included in this review contain several recommendations for municipalities to optimize their use of Facebook. These recommendations were classified into four categories: getting started, effective posts, page administrators, and online citizen participation and engagement.

4.4.1. Getting Started

Recommendations to maximize the use of a municipal Facebook page from the initial stages include ensuring the security of the Facebook page when setting it up (see documents 22, 28 in Supplementary Material S1), linking to the Facebook page on the municipal website for promotion (see document 9 in Supplementary Material S1), and using Facebook instead of Twitter and sticking to one account per platform (see documents 4, 29 in Supplementary Material S1). In addition, it was recommended that municipalities determine and clearly communicate the purpose of the Facebook page (inform, gather information, or engage) from the outset (see document 5 in Supplementary Material S1) and that they use an incremental strategy, starting with simple communications and then gradually generating engagement (see document 24 in Supplementary Material S1).

4.4.2. Effective Posts

Recommendations for creating effective posts fall into three broad categories: content, form, and frequency.

Content: Municipalities should post content that is interesting to citizens, including topics related to daily life and municipal services (see documents 2, 6, 22, 29, 30 in Supplementary

Material S1). Municipalities should identify the most relevant and interesting topics for citizens (see documents 6, 28 in Supplementary Material S1), limit Facebook posts with uninteresting or uninviting content (see documents 2, 6, 10 in Supplementary Material S1), and favor posts that encourage participation over information or self-promotion (see document 3 in Supplementary Material S1). Posts that provide transparency on municipal actions, initiatives, and decisions are also recommended (see documents 2, 4 in Supplementary Material S1), while municipalities are advised not to use Facebook during election campaigns to promote incumbents (see documents 1, 21 in Supplementary Material S1).

Form: Social media managers should adapt their vocabulary, content, and style to target different groups (e.g., very engaged citizens, citizens with low income) (see documents 8, 31 in Supplementary Material S1); use pictures, videos, and hashtags to generate interest and engagement, especially for less interesting content (see documents 2, 5, 9, 10, 17, 22, 23 in Supplementary Material S1); and keep the content of Facebook posts simple, avoiding large chunks of text (see document 22 in Supplementary Material S1). When text is used, it should generate commentary and discussion to favor the cognitive processing of information (see documents 2, 9 in Supplementary Material S1). Titles for posts should be carefully chosen and pre-tested if need be (see documents 23 in Supplementary Material S1). Posts that elicit positive or negative emotions, rather than neutral ones, encourage citizens to react and foster engagement (see document 4 in Supplementary Material S1). When sharing relevant educational content from organizations outside of the municipality, it should be communicated simply and directly (i.e., no external link or long video) (see documents 2, 9, 10, 28 in Supplementary Material S1). Finally, directly posing questions to citizens encourages participation and helps the municipality gain a better understanding of their interests and needs (see documents 23, 28 in Supplementary Material S1).

Frequency: Municipalities should publish a minimum of two and a maximum of ten posts per workday during peak online hours (see documents 5, 8, 9, 22, 28 in Supplementary Material S1), republish the same content with different titles and pictures to increase message effectiveness (see document 23 in Supplementary Material S1), and make use online tools to set a publication schedule and schedule posts (see documents 23, 29 in Supplementary Material S1).

4.4.3. Page Administrators

Recommendations on page administrators covered identifying administrators, training administrators, the attributes of effective administrators, and establishing a social media policy.

Identifying administrators: Municipalities should dedicate adequate resources to develop, manage, and monitor Facebook content daily (see documents 19, 24 in Supplementary Material S1) and recruit qualified Facebook administrators (see documents 4, 5, 8, 19, 26 in Supplementary Material S1). Maintaining a Facebook presence need not be expensive: the administrator can be an employee who spends one hour a day managing the account (see document 26 in Supplementary Material S1). Finally, it is recommended that municipalities grant administrator status to employees from various departments to leverage their knowledge of specific topics (see document 29 in Supplementary Material S1).

Training administrators: Municipalities should provide social media management training for staff on tracking and reporting impacts, building trust, generating online citizen participation, using social media creatively, and implementing a social media policy (see documents 11, 12, 16, 24, 29 in Supplementary Material S1). Employees should also be trained on basic Facebook management principles, such as maintaining a cordial and professional tone, being responsive, and updating content regularly (see document 24 in Supplementary Material S1).

Attributes of an effective Facebook administrator: A good administrator should think about whether the content is useful, positive, productive, and interesting before posting it and, if unsure, wait (see document 26 in Supplementary Material S1). It is also crucial that administrators be diplomatic, build a loyal following, and avoid engaging in online

debates in response to negative comments (see document 26 in Supplementary Material S1). It is likewise important that they effectively manage crises on the platform, which involves recognizing it, communicating privately with the parties involved, apologizing if needed, informing and soliciting feedback from the administration, and extracting lessons to avoid a similar situation in the future (see document 31 in Supplementary Material S1). Furthermore, it is essential the administrator maintain a good relationship and direct access to key officials in the organization to create connections with citizens (see document 27 in Supplementary Material S1) and avoid micromanaging other employees, trusting them to post content and manage risks (see document 24 in Supplementary Material S1). An effective Facebook administrator also makes recourse to technology to moderate the page and block specific keywords to avoid inappropriate and spam comments (see document 23, 31 in Supplementary Material S1), to monitor engagement and promote the page (e.g., through tools like Social Sprout, Hootsuite, or Facebook Analytics) (see document 22, 23 in Supplementary Material S1), and to continuously improve social media strategy through performance indicators (see document 19 in Supplementary Material S1).

Establishing a social media policy: It is important to clarify the role of page administrators to ensure that the posts align with brand image and values (see document 26 in Supplementary Material S1). Establishing a social media policy is crucial to define acceptable content, outline roles and responsibilities, prevent abuse and harassment, and develop a response strategy for inappropriate users (see documents 12, 19, 23, 24, 29 in Supplementary Material S1). Ideally, municipalities should have three Facebook policies: one for all municipal staff to prevent reputational damage, one for employees authorized to post on behalf of the municipality, and one for elected officials (see document 26 in Supplementary Material S1). There are three golden rules for an effective social media policy: it should communicate clear and reasonable expectations for employees' online conduct, facilitate monitoring of posts that may generate negative impacts, and be consistently enforced when violations occur (see document 27 in Supplementary Material S1). For sample social media policies, see documents 32, 33, 34, and 35 in Supplementary Material S1.

4.4.4. Online Citizen Participation and Engagement

Recommendations for municipalities to generate online citizen participation included developing a strategic plan for Facebook use, fostering active dialogue, communicating to citizens that their opinions matter, changing organizational culture to integrate social media, and measuring social media impact with tools.

Strategic planning: Municipalities should develop their strategy for reaching citizens—defining their objectives, target audience, content, and evaluation methods—before setting up their page (see documents 14, 21 in Supplementary Material S1). Facebook should be viewed as a complementary tool, not a replacement for other means of citizen and political participation (see documents 1, 9, 19, 20, 21, 31 in Supplementary Material S1). It is advisable that municipalities consider using other social media to expand their audience (see document 19 in Supplementary Material S1), while bearing in mind that online citizen participation and engagement may vary across municipalities and audiences (see document 14 in Supplementary Material S1).

Fostering dialogue with citizens: The selected documents recommend favoring posts that encourage active participation in public affairs, such as posts that elicit discussion on issues important to citizens (see documents 2, 4, 5, 8, 11, 12, 15, 20, 22, 28 in Supplementary Material S1). Interacting promptly with citizens by answering their questions and comments on Facebook (ideally within one hour) fosters engagement (see documents 4, 9, 15, 18, 20, 28, 30 in Supplementary Material S1). Municipalities can demonstrate receptivity by allowing citizens to comment and post on their Facebook wall (see documents 5, 15, 18 in Supplementary Material S1) and creating thematic Facebook pages where citizens can discuss specific topics, such as the environment or culture (see documents 18 in Supplementary Material S1). Strategies that lead to new visits to the page, including calls to action, are also recommended (see documents 15 in Supplementary Material S1). A recom-

mended approach involves four simple strategies: inform, by educating citizens on topics of interest (see documents 21 in Supplementary Material S1); ask, by requesting feedback from citizens and stakeholders to clarify issues, test ideas, and identify potential solutions (see documents 15, 21 in Supplementary Material S1); listen and learn, by engaging citizens and stakeholders in conversation (see documents 21 in Supplementary Material S1); and collaborate, by working with citizens and stakeholders to make decisions—for example, through a private Facebook group (see documents 21 in Supplementary Material S1).

Communicating to citizens that their opinions matter: Municipalities should build citizens' trust that their contributions are being considered in municipal decisions, including by providing transparency on the process and outcomes of online participation and engagement initiatives (see documents 11, 18 in Supplementary Material S1) and giving them a sense of responsibility and faith in change when they participate (see documents 12 in Supplementary Material S1). To further build transparency, it is recommended that municipalities clarify how their social media is managed, including by stipulating rules and privacy policies (see documents 20 in Supplementary Material S1). Finally, launching communication campaigns about the municipality's social media and opportunities for online discussion is advised (see documents 12, 20 in Supplementary Material S1).

Changing the organizational culture: It is recommended that municipalities formally integrate social media as a channel for receiving input and ideas (see documents 12 in Supplementary Material S1) and provide training for senior management and politicians about the value of using social media to engage with citizens (see documents 13 in Supplementary Material S1).

Measuring the impact of social media engagement and participation: Municipalities should implement social media monitoring and measurement systems for key engagement indicators (see documents 19 in Supplementary Material S1). In addition, they should listen to the needs of citizens using a variety of techniques, such as social media analytics, online surveys, and focus groups (see documents 18 in Supplementary Material S1).

5. Discussion

The main objective of the present review was to identify the best practices for municipalities' Facebook use to promote online citizen participation and engagement according to the scientific and gray literature. More specifically, it aimed to identify the benefits of Facebook use and the challenges municipalities face with this social network, as well as the recommendations for best practices. Our ultimate objective was to help municipalities develop an effective Facebook strategy. A thematic content analysis of 35 documents, including 20 from scientific literature and 15 from the gray literature, identified the main benefits, challenges, and recommendations.

Some of the benefits of using Facebook by municipalities identified in our study corroborate the findings of previous reviews. Indeed, in terms of citizen participation, a meta-analysis also confirmed the presence of a positive association between social media use and citizen engagement (Skoric et al. 2016), which is also in line with previous research (Lappas et al. 2022). In terms of electoral participation, two previous reviews found that social media can encourage political participation, such as voting (Ben Mansour 2017; Skoric et al. 2016). Finally, in terms of citizens' sense of belonging to their municipality, a previous review on the use of social media in politics mentioned that politicians can use social media to interact with citizens and give citizens a sense of closeness to politicians (Ben Mansour 2017).

The main challenges for municipalities are mainly related to problems in their Facebook communication strategy, such as using the platform to disseminate information without promoting dialogue and collaboration or publishing content that is not interesting for citizens nor conducive to engagement. A previous systematic review found that one barrier to citizens' online participation was their lack of interest in political matters or public affairs (Oliveira and Garcia 2019), which may result from a lack of interesting online content. Another challenge is that some municipalities do not value Facebook as a strategy

to solicit online citizen participation and engagement. A previous review also reported that governments rarely use social media to promote governance, such as by encouraging citizen participation and engagement (Perlman 2012), instead mainly using social media during elections and electoral campaigns to promote voter participation and for fundraising (Perlman 2012).

The documents reviewed made several useful recommendations for municipalities interested in using Facebook to promote citizen participation and engagement. Of note, it is important their posts be effective: posts should be relevant, interesting, frequent, and feature attractive content (e.g., pictures and videos, surveys, questions, simple posts). In general, it is recommended that municipalities post content that appeals to citizens and promotes discussion, interactivity, and feedback, rather than information-dense posts, the interest and use of which may vary for different citizens. Similarly, a previous review highlighted that social media allows for interactivity and personalization (Ben Mansour 2017). Another study also reported that Facebook can be used by organizations to gather feedback from users who subscribe to their page (Magnusson et al. 2012). Finally, a systematic review mentioned that content that is difficult to understand can be a barrier to citizens' online participation (Oliveira and Garcia 2019), suggesting that there is a need to keep Facebook posts short and simple.

Five observations can be made from this review's findings. First, Facebook is a tool that rural municipalities should integrate into their communication strategies, considering its many benefits for the municipal organization, elected officials, and citizens. However, it is essential that they carefully manage their page to obtain optimal results. For example, the role of the page administrator should be clearly defined, as they are responsible for updating information, monitoring interactions, and searching for useful comments (Agostino 2013). Careful management of the municipal Facebook page is also essential to prevent other accounts from playing this role and sharing ambiguous or false information with citizens (Agostino 2013). In fact, privacy issues and lurking behavior were identified as two barriers to citizens' online participation in a previous systematic review (Oliveira and Garcia 2019).

Second, the documents reviewed offer two distinct types of recommendations: recommendations to improve reach and recommendations to improve engagement. Recommendations to improve the reach of Facebook posts (e.g., views, number of likes) are more numerous and detailed than the latter and pertain to the form, content, and frequency of posts. There are comparatively few recommendations of the second type—that is, recommendations for fostering two-way communication with citizens (i.e., discussion and interaction rather than a unidirectional, informational approach)—despite the fact that Facebook is presented as a tool with the potential to foster online citizen participation and engagement. For example, a guide for municipalities in Alberta, Canada, recommends four main strategies—inform, ask, listen and learn, and collaborate—but offers few concrete means to achieve them (Alberta Urban Municipality Association & Alberta Association of Municipal District and Counties 2015). There is thus a need for additional information on Facebook communication practices such as surveys, contests, and encouraging citizens to post comments, interact with municipalities, get involved in the community, and participate in online or offline discussions with municipalities (Bellström et al. 2016).

The third observation is that the terms "citizen participation" and "citizen engagement" can be confusing in a social media context. Bonsón et al. define citizen engagement as "individual or collective action behavior aimed at solving social problems in the community" and whose essence "resides in the interaction between citizens and the government" (Bonsón et al. 2019, p. 482). These authors also point out that the terms "citizen participation" or "participatory democracy" are often used interchangeably with "civic engagement" (Bonsón et al. 2019). However, the term "digital or online engagement" is also used by multimedia designers to refer to "active involvement with content and, in effect, other people in a web-based environment" (Alberta Urban Municipality Association & Alberta Association of Municipal District and Counties 2015, p. 46). The same terms may therefore be used in the documents included in the review to describe very different kinds of participation.

In a recent study, Wukich (2022) addresses this issue by proposing a structure–content framework to characterize and encompass the various forms of social media engagement in government.

The fourth observation is that integrating Facebook into a municipality's communication strategy requires planning. According to the documents included in our review, this should involve drafting a digital communication policy. Better training for employees managing the Facebook page was also recommended, as well as support for municipalities in developing their social media strategy. In fact, a survey of Belgian municipalities on their use of social networking sites found that one of the main barriers to using Facebook was a lack of guidelines (FuturoCité 2017). Municipalities mentioned that their main needs were to receive social media training, to convince managers of the importance of a social media presence and of devoting time to managing social media, and to gather feedback and have opportunities to discuss good practices (e.g., reference guides, discussion forums) (FuturoCité 2017).

The fifth and final observation is that there are few practical guides on the use of Facebook or social networking sites for municipalities, especially rural ones. The scientific articles mainly focused on analyzing Facebook posts from European municipalities. There were also few scientific articles on the experiences and perceptions of municipal Facebook pages from the perspective of municipal officials and citizens. The needs of citizens and the impact of municipal Facebook use for citizen solidarity and mutual aid were not much addressed. This is surprising, given that a previous meta-analysis reported a positive association between social media use and civic engagement, such as volunteering for charities, raising awareness of community issues, and seeking help for particular groups (Skoric et al. 2016). Finally, the differences in social media management for small or rural municipalities versus large urban centers were not addressed in the documents reviewed, and the recommendations were often intended for large urban municipalities. Nevertheless, by bringing together knowledge and information that was previously scattered across many documents, some less likely to be accessed by public servants, we believe that this review can be useful to municipalities.

6. Conclusions

To our knowledge, this is the first review to explore the benefits and challenges of online citizen participation and engagement on municipal Facebook pages and to document best practices in this area for municipalities. However, this study also has limitations. First, considering the little documentation on online citizen participation and engagement on municipal Facebook pages, we could not limit our search to documents addressing rural municipalities specifically. Therefore, although the recommendations identified in this study can be used by rural municipalities, they were not all retrieved from sources focused on the resources or challenges specific to small rural municipalities. Second, our search strategy could have limited the documents from the gray literature, as municipal reports or guidelines are not always publicly accessible. To address these limitations, interviews could have been conducted with stakeholders from small rural municipalities to complete the data.

In addition to promoting online citizen participation in public affairs, Facebook can offer many benefits to municipalities, such as fostering citizens' sense of empowerment and their sense of closeness and belonging to their community. The main challenge that municipalities face is developing a communication strategy that will support such citizen empowerment and sense of belonging. Recommendations on how municipalities can achieve these goals include drafting Facebook posts that appeal to citizens and that encourage discussion, interactivity, and feedback, and giving priority to such posts that lead to engagement over informational ones. Integrating Facebook into municipal communication strategies requires careful planning.

The present review also identified areas where additional studies are needed. Given the various definitions of "citizen participation and engagement", it would be helpful

if a common definition were agreed upon; this would make studies more comparable, especially in terms of levels of citizen participation. There is little information on concrete social media strategies for municipalities. In fact, few documents were specifically intended for municipalities, and small or rural municipalities were especially neglected, despite the fact that Facebook could be particularly useful for reaching citizens living in sparsely populated or remote areas (Flood-Grady et al. 2020). Finally, we hope that the present results will support municipalities, and rural municipalities in particular, in using Facebook and social media to communicate with citizens and foster online participation and engagement.

Supplementary Materials: The list of the documents included in the review can be downloaded at: https://www.mdpi.com/article/10.3390/socsci13030127/s1, Supplementary Material S1: Documents included in the review.

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Contested Borderlands: Experimental Governance and Statecraft in the Laos Golden Triangle Special Economic Zone

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Abstract: The Golden Triangle Special Economic Zone (GTSEZ) in northwest Laos exemplifies an experimental governance model, where sovereign powers are partially privatized to drive economic development. Established in 2007 through a 99-year concession with the Kings Romans Group (KRG), a Chinese gaming company, the GTSEZ is integral to Laos's strategy of leveraging Special Economic Zones (SEZs) for modernization. This paper examines the complex dynamics between the Lao state and non-state actors within the GTSEZ, highlighting its fragmented yet pragmatic statecraft. Drawing on extensive fieldwork from 2014 to 2018, the study examines the GTSEZ's historical connections to the opium trade and its contemporary socio-political and economic roles. The zone's creation has generated both enthusiasm and criticism, particularly concerning sovereignty, local impacts, and controversial activities. The paper also discusses the broader implications of SEZs in Laos's nation-building efforts, and the GTSEZ's balance of economic openness with regulatory oversight, enhancing the understanding of experimental governance in Southeast Asia.

Keywords: experimental governance; Laos; SEZ; sovereignty; territory

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1. Locating the Golden Triangle Special Economic Zone

Initiated in 2007, the GTSEZ operates under a 99-year lease agreement with the Hong Kong-registered Kings Romans Group, led by Chinese investor Zhao Wei. The KRG paid a leasing fee of USD 850,000 and secured a territory of 100 square kilometers. With a mix of development area (30 percent) and conservation area (70 percent), the zone serves as a focal point in Laos's strategy to leverage SEZs for national modernization. The GTSEZ presents a unique case of experimental governance, where sovereign powers are partially devolved to private investors in exchange for economic growth, creating a hybrid governance model that blends state authority with market-driven policies.

Since its inception, the GTSEZ has operated through ambiguous agreements between the Lao state and non-state actors, raising significant questions about the distribution of authority, sovereignty, and the management of border control, land rights, and the rights of SEZ dwellers and workers. These uncertainties exemplify the broader tensions that arise when traditional state functions are delegated to private investors in the pursuit of economic development. Despite the formal articulation of checks-and-balances system via the Lao government's Decree n. 443/PM, promulgated in 2010 (Lao PDR 2010), the practical execution of governance within the GTSEZ remains fragmented and opaque.

My fieldwork, conducted in the GTSEZ between 2014 and 2018, provides critical insights into these complexities. I first visited the zone for a month in April 2014 as part of a documentary film-making project led by a Chinese documentarian. The initial plan was to document the development of the zone and establish a filmmaking school at the request of Mr. Zhao Wei, president of the Kings Romans Group (KRG) and chairman of the GTSEZ. After one month, however, the school was shut down and converted into a private clinic for medical tourism. I negotiated with the SEZ Chinese managers to remain in the SEZ and, after obtaining ethical clearance, I became involved in various capacities, including

informally teaching English and Chinese to SEZ workers, and facilitating translations at the newly opened clinic, which also operated as informal hospital for SEZ dwellers. These roles provided me with privileged access to the zone's social fabric, and I developed close relationships with key actors of the zone. I often shared meals with Lao government officials and casino managers, engaging in in-depth conversations that offered insights into the challenges they faced in their management roles. Over time, I also built strong connections with workers of different nationalities, participating in their cultural celebrations, religious events, and everyday life, which gave me first-hand insights into their daily struggles and aspirations. As a result, this paper combines ethnographic observations with documentary analysis, semi-structured interviews, and informal conversations with Lao officials, casino managers, and workers, to explore how governance in the GTSEZ is exercised through a mix of formal and informal practices.

These interactions informed the two case studies that serve as the foundation of this paper. The first examines the transformation of border-control mechanisms within the GTSEZ to highlight the strategic role of the state in managing mobility, security, and labor flows to meet the demands of private investors like the KRG. The second examines the management of the Burmese workforce—which makes up a large portion of the unskilled and semi-skilled labor pool in the GTSEZ—and shows how the Lao government balances economic openness with regulatory control. Through these case studies, this paper aims to contribute to the discourse on statecraft and sovereignty in Southeast Asia, by showing how this SEZ experiment blends hybrid forms of governance.

Conducting research in the GTSEZ was not without its challenges. Gaining clearance from local authorities was a critical step in my research process. The Lao vice chairman of the GTSEZ welcomed my interest in the zone and granted me access, but I also needed Mr. Zhao's explicit permission to interview workers and access various casino facilities, as well as KRG management offices. These bureaucratic processes underscored the complex dynamics of authority in the zone, where private investors like Mr. Zhao wielded significant influence over who could dwell in the zone and for what reasons, raising questions about how authority and governance were negotiated in this space.

A key facet of this ambiguous governance revolves around the conceptualization of SEZs as "neoliberal enclaves," as articulated by Aihwa Ong in her seminal work *Neoliberalism as Exception*. Ong argues that these SEZs are the product of "techniques of calculative choice institutionalized in mechanisms and procedures that mark out special spaces and labour markets, investment opportunities, and relative administrative freedom" (Ong 2006, p. 19). This definition helps framing the GTSEZ as a zone where the Lao government devolves significant regulatory authority to the KRG to attract foreign investment. The delegation of such powers, however, creates opacity in the division of authority between state and private actors. This leads to tensions between market-driven objectives and state sovereignty.

Mr. Zhao Wei holds sway over the zone's economic and financial strategies.[1] The KRG has authority to sublease or transfer land rights, set transaction prices, and review business applications. The company's fiscal policies align with a broader market-oriented agenda, offering incentives for agribusiness ventures and reducing leasing tariffs to attract investment.[2] By 2016, the GTSEZ had attracted approximately US$ 1 billion in investments across 3000 hectares, with 59 domestic and foreign enterprises subcontracted by the KRG (Lao PDR 2016, p. 28). These administrative privileges, exemplify a significant transition from state to private governance.

The KRG's role in infrastructure development is critical to Laos's modernization goals. The GTSEZ has seen extensive urban and infrastructure projects, including water supply systems and waste disposal, administrative buildings, road networks, housing for workers and local villagers, and the construction of an international airport (RFA 2023b). The KRG's plans to transform the GTSEZ into a vibrant urban and tourist hub were modeled after the Overseas Chinese City in Shenzhen, a project associated with symbols of urban modernity

in 1990s China (Nyíri 2012, p. 541). This transformation showcases how private capital drives modernization efforts in Laos, reshaping the state's governance structures.

Additionally, the KRS manages the zone's human capital. The GTSEZ attracts a diverse workforce from China, Myanmar, Thailand, Laos, Vietnam, the Philippines, Indonesia, Ukraine, Russia, and Malaysia. While the KRG sets general employment conditions, individual enterprises have the autonomy to tailor their workforce management practices. The KRG funds salaries, bonuses, and pension allowances for Lao government officials and staff, adjusting these provisions based on the zone's economic performance.[3] A private security force, operating under the KRG, is responsible for maintaining public order and handling minor disputes. However, these security units defer to Lao police for unresolved issues, highlighting the complex division of authority in the GTSEZ.

This decentralized approach to human resources and security, while aimed at efficiency and order, engenders an environment ripe for unequal and discriminatory management practices, particularly for segments of the population such as the Burmese workers. Despite the KRG's extensive control, the Lao government retains formal sovereignty over the zone. The state continues to oversee legal matters, infrastructure approvals, and tax collection. Investment in the zone is incentivized through customs exemptions and tax breaks, contributing to state revenues. Government officials also provide foreign workers with legal residency documents, grant licenses to enterprises, and approve major infrastructural projects, ensuring that increased business activity in the GTSEZ benefits the state.[4]

Security in the GTSEZ is jointly managed by Lao military and police forces and the KRG's private security units. The Lao state's military presence complements the KRGS's security apparatus, patrolling the zone and handling issues beyond the KRG's capabilities. According to the Decree no 443/PM,[5] state police intervene for the settlement of issues that the KRG is unable to mitigate. The KRG's substantial control over economic and security aspects within the GTSEZ, juxtaposed with the Lao government's retained sovereignty and regulatory oversight, illustrates a nuanced balance between private enterprise and state governance. Despite the KRG's dominance over economic and security matters, the Lao government remains a key player in the GTSEZ's governance.

I argue that the Lao government leverages the GTSEZ as part of its nation-building strategy, using the zone not only to facilitate foreign capital, but also as a tool to modernize the country's borderlands. Various forces, including local and foreign actors, international market dynamics, and regional political influences, interact with the Lao state's objectives, contributing to the framing and execution of the project. The state role is not diminished but reimagined through flexible, pragmatic governance mechanisms that enable collaboration with private investors and accommodate market forces. At the same time, these forces are integrated into the state's strategic oversight and development goals. Consequently, in the GTSEZ, state sovereignty is reconfigured in response to these diverse influences, balancing the pursuit of economic development with the management of external market pressures.

2. The GTSEZ and the Opium Legacy

The GTSEZ's inception and operational agenda cannot be fully comprehended without acknowledging its geographical and historical significance within the opium legacy of the Golden Triangle. This region, notorious as one of the world's most prolific opium-producing areas, has been at the center of significant geopolitical shifts and policies aimed at eradicating drug trade and cultivation. The transition from this legacy into a narrative of modernization is central to the GTSEZ's establishment, as the zone is framed not only as a mechanism for economic growth, but also as a means to distance the region from its past and align with global development discourses.

The establishment of the GTSEZ rests on the premise of an IR discourse focused on eradicating the widespread drug economy. The rhetoric of modernization is woven into these efforts. The Golden Triangle, spanning parts of Thailand, Laos, and Myanmar, became notorious in the 1970s as one of the largest opium-producing regions, contributing

to around two thirds of global production (Paoli et al. 2009, p. 38). In Laos, particularly among the Haka highlanders, opium was integrated into daily life and economic practices, deeply embedded in trade, employment, and ceremonial activities (Cohen 2013). Throughout the 1960s–1970s, the opium trade supported the emergence of quasi-state authorities and rebel groups, creating a complex web of economic dependencies and regional instability (Lintner 2003; Paoli et al. 2009, p. 218). For instance, following the collapse of the Communist Party of Burma in 1989, the central government granted 26 armed groups economic and political autonomy (Than 2016, p. 152), fueling further opium production (Rippa and Saxer n.d.).

International responses to this crisis varied, with the U.S. launching its infamous "war on drugs" in the 1970s and various UN-led efforts to counter the region's illicit activities. The 1990s saw intensified anti-drug efforts, with the UN and the U.S. focusing on curbing heroin trafficking, which had surged to between 10 and 15 metric tons annually (McCoy 1999, p. 142), fueled by the increasing number of heroin users in the U.S (McCoy 1999, p. 142). As part of these efforts, the UN rolled out alternative development programs in Myanmar, Thailand, and Laos aimed at replacing the opium economy with more sustainable agricultural ventures. However, these efforts yielded mixed results, particularly in Myanmar and Thailand, where drug lords shifted from opium to methamphetamine production (Chouvy 2010; Gillogly 2004; Lintner 2009). Laos saw a significant legal and operational transformation through the United Nations Drug Control Programme (UNDCP) between 1994 and 2000. The government passed a 1996 amendment to the Lao drug control law, bunning the production and possession of opium.[6] With UN support, USD 80 million was allocated in 2000 to eliminate opium crops (Cohen 2009, p. 425). Opium production decreased dramatically, from 42,130 ha in 1989 to 1500 ha in 2007 (Cohen 2009, p. 425).

However, these successes came at a significant social cost. In areas like Luang Namtha province, highlanders endured loss of income, decapitalization, and rice shortages, leading to migration to lowland areas with scarce arable land (Cohen 2013). By 2005, UNODC and the Lao National Commission for Drug Control & Supervision foreshadowed recidivism (UNODC 2008, p. 4), prompting the World Food Programme's 2007 relief operation to address severe food insecurity (WFP 2008).

Scholars have suggested that the UN-promoted anti-opium programs' failure induced the Lao government to explore alternative strategies for economic recovery, particularly with China's support (Lu 2017; Cohen 2009; Stuart-Fox 2009; Tan 2015). Both nations shared common interests in eradicating opium, which was viewed as a symbol of weak borderland control (Lu 2017, p. 726). For China, the opium trade held historical and ideological significance, particularly in relation to the 19th-century Opium Wars. Since the 1950s, the Chinese Communist Party had linked opium eradication to national security, closing its borders with Laos and Myanmar to prevent drug trafficking and investing heavily in rehabilitation programs (Lu 2017, p. 730).

Opium eradication in northern Laos formed part of broader land reform, replacing shifting cultivation among highlanders with new crops to improve livelihoods and tighten state control (Ducourtieux et al. 2005; Rigg 2005). When Chinese frontiers reopened in the 1980s, drug trafficking surged, prompting the Chinese government to invest in rubber plantations in Yunnan and opium substitution programs in the Golden Triangle.

In Laos, rubber was associated with modernity and development (Diana 2007), and rubber plantations along the Chinese border grew significantly after 2004, following deeper cooperation between Laos and China (Lu 2017, p. 726). China's "Going out" policy of the early 2000s facilitated this expansion, encouraging Chinese enterprises to invest abroad and bolstering economic ties between the two nations (Tan 2014). China's broader role in the region also extended to infrastructure projects through the Greater Mekong Subregion (GMS) program and the Belt and Road Initiative (BRI). Launched officially by Chinese President Xi Jinping in 2014, the BRI aimed to reinvigorate the ancient "Silk Road" trade routes, positioning Yunnan province as a gateway to Southeast Asia (Wang and Miao 2016).

Infrastructure projects, such as the North–South Economic Corridor linking Kunming to Bangkok, further solidified China's presence in Laos (Tan 2014).

The GTSEZ emerged at the nexus of these geopolitical and economic transformations, and it is anchored to efforts of rebranding the region from a notorious drug-production zone to a beacon of modernization and development. This transformation is reflected in the bright-red and blue slogans adorning the zone, written in both Chinese and Laotiaon, promoting themes such as "Peace", "Cooperation", "reciprocal support", "Innovation", and "Craftmanship". These signs echo key themes from Chinese Communist propaganda: "Seek Truth" (*qiushi* 求实) from Deng Xiaoping's era; "Harmoniousness" (*hexie* 和谐), from Hu Jintao's period; and "Innovation" (*chuangxin* 创新), which is central to Xi Jinping's rule; signaling an attempt to legitimize the SEZ's operations by aligning them with Chinese state power. A prominent monument, bearing the inscription "Long live the friendship between Laos and China", further underscores the cooperation between the two countries.

This cultural and political rebranding of the region extends to how its history is framed. A giant billboard visible from the Mekong River markets the region as the "Mysterious Golden Triangle," emphasizing its newfound allure for tourists. An introductory note for an exhibition hall at the zone's heart states,

> The seductive opium and the sound of the gunshots have long gone. Instead, what remains are its unforgettable nature and cultures.[7]

This narrative casts the drug economy to a distant memory, weaving an explicit IR discourse into the urban fabric of the GTSEZ. Simultaneously, it legitimizes the developer as a modernizer, while also reframing the Golden Triangle's history via a more positive image.

The Kapok Flower Festival, an annual celebration held at the end of January in the GTSEZ, exemplifies this cultural rebranding. Since the SEZ's establishment, the KRG has sponsored the event, which blends culture and commerce to attract tourists and promote the region's new image. Each year, thousands of visitors from nearby villages attend the festival to watch performances featuring artists from Laos, China, Myanmar, and Thailand. In 2018, during my fieldwork, the festival featured ethnic minority dance troupes from China, Burmese singers, and Thai performers, culminating with a Lao national female beauty contest.

Under the patronage of the KRG, the festival serves as platform to enhance Mr. Zhao's public image, aligning his role in the zone's development with the Lao government's broader modernization goals. The 2018 edition of the festival coincided with national "Visit Laos 2018" tourism campaign, further emphasizing the partnership between state and non-state actors in promoting the region's visibility. Broadcasted on national television, the event was attended by high-ranking Lao officials, including Madam Pani Yathotou, President of the National Assembly of Laos, and Somdy Duangdy, Deputy Prime Minister. On 27 January 2018, Deputy Prime Minister Somdi Duangdy awarded Mr Zhao an important development prize in recognition of his contributions to the GTSEZ, cementing the government's endorsement of the zone as a critical component of national development.

The cooperation between state and non-state actors in the GTSEZ represents an experimental governance model that blends Lao state-driven capitalism with neoliberal market principles, yet fully aligns with neither. In the following sections, I will first examine the broader institutionalization of SEZs in Laos as part of the state-building process. While this institutionalization does not necessarily reflect efficient or unproblematic governance, it underscores the Lao government's gradual efforts to integrate these zones into its broader state-building agenda. Following this, I will delve into two case studies, about border control and labor management, respectively. I will demonstrate how these governance mechanisms are essential to the Lao state's ability to maintain sovereignty, reinforce control, and promote development in this historically volatile border region.

3. Institutionalization and Development of SEZs in Laos

In a 2011 promotional video for SEZs in Laos, H.E. Somsavat Lengsavad, Deputy Prime Minister and Chair of the Lao National Committee for Special Economic Zones, affirmed,

> Special Economic Zones are one of the economic development approaches that the Government of the Lao PDR has been valuing, aiming to attract domestic and foreign investment toward building production base with latest technology as well as building new developed cities. SEZs also promote national economic growth by creating more employments for Lao people in order to create necessary condition for the country to graduate from the Least Developed Country status by 2020, and to bring the country to a prosperous future.[8]

The opening of SEZs in Laos reflects the government's pursuit of a dynamic form of liberalization, yet their institutionalization does not necessarily guarantee smooth or uncontested governance, as I will discuss later in the paper. Looking at their gradual integration into the national agenda, however, is indicative of the government's efforts to navigate a complex terrain of sovereignty, regional instability, and private sector demands. In the case of the GTSEZ, this further adds to the gradual formalization of borderlands, and, thus, deserves our attention to observe the incorporation of private interests into a broader state-building framework.

Since the early 2000s, the Lao government opened 13 SEZs and has gradually formulated a rhetoric of validation to incorporate their economic model within the larger scope of national economic agenda. Laos's sixth national assembly in 2006 acknowledged SEZs as part of a broader strategy to enhance "regional and international environmental cooperation, especially with neighbouring countries, ASEAN members, Mekong region countries and international organisations" (Lao PDR 2006, p. 122). The seventh five-year plan (2011–2015) emphasized the importance of expanding SEZs as part of a "special development strategy" and foster a more "favourable business environment" (Lao PDR 2011, p. 104). By the eighth five-year economic plan (2016–2020), SEZs were commended for their achievements. Presently, seven SEZs are under joint management by the government and private developers, and six are entirely managed by private contractors (Lao PDR 2016, pp. 27–31).

These optimistic representation of SEZs on official documents does not come without its tolls. Boonpen Munphosai, Minister of Government Office and Vice Chair of the National Committee for Special Economic Zones (NCSEZ), noted that SEZs might generate short-term economic imbalances, clarifying, though, that these areas "will be the key engine to accelerate development, connecting [Laos] with regional and international economy, creating employments, and bring poverty eradication into a wider scope" (Laungaramsri 2015, p. 215). The official economic data on the specific output of each zone seems to support the government's enthusiasm. According to the implementation report of the seventh five-year plan NSEDP, during the 2011–2015 period alone, the total investment in the SEZs amounted to USD 1.27 billion.[9] Even though these numbers are difficult to verify, they justify the underlying optimism that motivates the government to balance the risks with the envisioned outcomes.

To mitigate the drawbacks of these experiments, the Lao government created a robust legislative framework. Initial government decrees in 2002–2003 guided the establishment of the Savan-Seno SEZ (Decree no 148/PM) (Lao PDR 2003). Further legal reforms from 2009–2011 sought to strengthen SEZs' institutional foundation. The 2009 Law on Investment and Promotion defined SEZs as "Area(s) that the Government has determined to be developed into a new and all-round modernized town, a place to induce domestic and foreign investments",[10] outlining operations, tax benefits, inspections, and investor rights.

Subsequent regulations, such as the 2010 Decree on SEZs, clarified relationships between central and local government and developers. These regulations granted SEZs autonomy in business operations, addressing developer and investors' advantages, benefits

for local administration, land boundary issues, and internal management and inspection of SEZs. It also expanded the definition of SEZs, portraying them as areas with the potential to "facilities and autonomy in undertaking business operations more than other areas countrywide, through comprehensive building of social and economic infrastructures,"[11] fostering economic competitiveness.

In 2010, the establishment of the Lao National Committee for Special Economic Zone (NCSEZ) further formalized the government's effort to manage SEZs. This body oversees SEZs across the country, approving relevant legal acts, promoting investment, and addressing economic, social, and security issues within the zones.[12]

The coordinated efforts to harmonize SEZs with the national legal framework illustrate Laos' commitment to using these zones as tools for state-building and modernization. Yet, while SEZ operations are intended to function with a sense of autonomy and self-determination, the devolution of Lao sovereignty within these zones remains a delicate balancing act. The creation of the SEZ Administration Committee and the Economic Executive Board reflects the government's ongoing efforts to govern this complexity.[13] These bodies, while managed by government-appointed officials, operate under the continuous scrutiny of various state agencies, including the central government, the NCSEZ, the Secretariat to National committee for SEZs, relevant ministries, and state organs. This illustrates the tension between private sector independence and the need for state control.[14]

The institutionalization of SEZs is closely tied to the Lao government's broader effort to assert control over historically unstable regions. While official government documents predictably reflect optimism about the success of these zones, this rhetoric often overstates their actual impact, glossing over the problematic effects that come with their implementation. Nonetheless, the inclusion of SEZs in the national plan aligns with the government's long-term agenda and indicates that the state is actively involved in their development. The increased formalization of GTSEZ borders and the regulation of Burmese workforce illustrate how governance is negotiated to reaffirm state authority while accommodating market demands.

4. Hybrid Border Statecraft

The transformation of borders in the GTSEZ, reflects a gradual shift from a porous, unregulated space to one characterized by increasingly formalized controls of mobility. This shift is evident in the experience of a Burmese worker who moved to the zone in 2010,

> When I first got here just got here, it was very easy to cross the border. Every month, since at that time there was no supermarket in the SEZ, we would cross over to Thailand to get whatever we needed. The Immigration building became an international crossing point only over the past two years, and since the beginning Chinese and Lao were working together. At the beginning, the office was only minding the passports of the Chinese people. But now they are very strict, and all the workers must have the working permit and the residence permit.[15]

The shift toward increasingly regulated borders has significant implications for people's mobility, which becomes conditional on their economic values and employment status. As borders are reimagined as tools for selection and exclusion, different groups of people are subject to varying levels of control. Casino customers from China, a key demographic for the zone's economic model, are granted special treatment. They receive a 10-day pass, allowing them to move freely within the SEZ without frequent passport checks. Their passports are held by the KRG office on the Thai side of the border, and upon crossing into Laos, they are transported to the casino facilities on KGR taxis. VIP and "Super VIP" customers bypass border checks altogether, driven directly to their destination in luxury vehicles.

In contrast, workers, particularly Burmese migrant workers, face stricter controls. They are required to have valid work and residence permits, which must be renewed periodically. As one Burmese worker explained:

> Sometimes, those who have just moved here don't have any residence permit, but they have no job yet so they cannot pay for it. Even for those who have a job like me it can be very complicated because applying for documents requires to go 3–4 times to the office and our work shifts change every 10 days.[16]

This testimony underscores the stratified nature of border management within the GTSEZ, where individuals' mobility and access to opportunities are determined by their perceived economic utility. High-value customers and investors enjoy privileges, while low-wage workers must navigate a more complex, costly bureaucratic system.

A key feature of border management in the GTSEZ is the collaboration between the Lao government and private developer. During my visit to the SEZ in 2018, I observed how groups of Chinese workers were processed by Lao immigration officials with the assistance of KRG employees. Group leaders wearing casino uniforms handled batches of passports, moving with ease from one counter to the other of the customs building, organizing the groups, and shouting directions. Behind the counters, the Lao officials processed piles of passports, registering names, stamping temporary visas, and addressing group leaders in Chinese when needed. Each passport was accompanied by a CHY 100 banknote slipped in between the passport pages, an additional informal fee to expedite the processing of immigration cards.

While, upon my first visit to the zone in 2014, these practices were completely managed by the Lao custom officers with the informal support of KRG representatives, by 2018, the customs office had a waiting room and several front desks with both Lao and Chinese employees that jointly managed these operations. Long lists of names were affixed on a billboard in front of the immigration building, indicating when employees could retrieve their passport after the new working visa was issued in Vientiane. These desks managed the migration documents of both Chinese and non-Chinese workers—Ukrainians, Russians, Filipinos, Indonesians, and Malaysians—employed in the zone. This joint administrative model reflects the Lao state's response to the increased cross-border mobility of people. By combining formal and informal practices, the arrangement facilitates the efficient movement of customers and workers into the GTSEZ while generating revenue for the state from through formal visa processing and informal fees.

This system underscores what Balibar (Balibar 2002, p. 83) describes as the polysemic and heterogeneous nature of borders, where borders serve simultaneously multiple functions "of demarcation and territorialization—between distinct social exchanges or flows, between distinct rights, and so forth" (Balibar 2002, p. 79). Seen from the perspective of this regulatory function, the border becomes a generative force; it plays a strategic role in shaping the social and economic landscape (Mezzadra and Neilson 2013, p. vii). The GT borderlands, through experimental governance, have become centers of articulation of mobility, as the Lao government negotiates regulations and scrutinizes operations to maintain authority.

The formalization of borders and selective regulation of mobility extend to the internal governance of the zone. The enforcement of traffic rules exemplifies this process. Article 62 of the Decree no 443/PM outlines special conditions vehicle registration, with different colored plates indicating varying degrees of mobility: green plates are restricted to the SEZ, yellow plates allow for limited movement outside the SEZ, and blue plates, typically for government or privileged vehicles allow for greater mobility. This parallels external border controls, where selected individuals, like VIPs, enjoy greater mobility while others face more restrictions.

Nevertheless, much like border management, traffic control operates through a combination of formal rules and informal, discretionary practices. For instance, Wei Yuan, a Chinese worker, faced an arbitrary demand for extra payment when registering his motorbike:

> The higher is the value of your motorbike, the higher will be the price for the plate number. I had to pay USD 82.50, but the policeman asked for USD 137.50. He did not say why, he just asked for the money. I think it is because he saw I

> am Chinese, and he thinks I have money. But I had only USD 82.50 with me, so I told him 'I only have USD 82.50, I don't have any more.' They did not want to give me the plate. Only when I took out USD 5.50, and I said, 'this is really all I have', they finally signed the papers and gave me the plate. On the receipt they wrote I paid USD 82.50.[17]

This incident highlights how formal rules are open to negotiation and manipulation. The policeman's demand for extra money mirrors the discretionary power seen at border crossings, where officials can choose how strictly to enforce regulations based on perceived economic value. In this case, the police officer becomes an entrepreneur, exploiting the flexibility of the system for self-advantage.

In *Neoliberalism as exception* (Ong 2006), Ong argues that in Southeast Asia, the states' market-driven pursuit of development conflates state policies with corporate interests, leading to fragmented governance. This suggests that the notion of national homogeneity is no longer central to governance (Ong 2006, p. 77). Some see this blending of neoliberal market regimes and state policies as "a kind of shadow or para-state" that erodes national sovereignty" (Walsh 2009). Thai scholar Pinkaew Laungaramsri describes Chinese investments in the GTSEZ as examples of economic imperialism, suggesting that the Lao state acts as a "broker state", relinquishing power to foreign investors (Laungaramsri 2015; Laungaramsri and Sengchanh 2018).

In contrast, alternative perspectives, such as those offered by Andrew Walker (Walker 2008) and Antonella Diana (Diana 2017), recognize the centrality of the Lao government in implementing governance on the borderlands. Walker, in his research on the Lao–Thai border, noted that while globalization has strengthened border regulations, state control over commerce remains fluid, often exploited by non-state actors for entrepreneurial gains (Walker 1999). He criticized the overemphasis on flexible territorial governance as exceptional, arguing that state agendas always still prioritize managing people–territory relationships (Walker 2008). In Boten, for example, Diana shows how the Lao government had granted "exceptional" conditions to a Chinese private investor to establish a casino, but later withdrew its support due to concerns over public morality (Diana 2009). This underscores the state's ongoing scrutiny of such governing experiments, indicating a more active role than some theories of neoliberalism suggest (Diana 2009, pp. 13–14). For Diana, in the GTSEZ, like in Boten, the state intervenes through "ad-hoc experimentation" (Diana 2017).

Danielle Tan also challenges the view that opening the Lao state to foreign investments signifies a loss of sovereign power. Instead, she argues that SEZs serve as tools for the Lao government to exert greater control over marginal territories while reducing development costs (Nyíri et al. 2017).

These latter perspectives align with my observations of the GTSEZ, where the state collaborates with corporate actors like the KRG to manage mobility and regulate activities. This hybrid governance allows the state to balance its desire for economic growth with its need to assert control over its borderlands. Formal regulations coexist with informal, discretionary practices, where state actors, like the police officer in Wei Yuan's case, leverage their authority for personal profit.

Anita's experience within the SEZ further illustrates this dual role of the state. Anita, a Ukrainian casino worker, was involved in a serious motorbike accident while driving in the SEZ without a helmet and under the influence of alcohol. Her passenger, a Chinese national, was severely injured, went into a coma, and required a lengthy rehabilitation period. Despite the gravity of the incident, it was not resolved through legal channels. Instead, the KRG took control, initially confiscating Anita's passport and salary card, preventing her from leaving the SEZ. However, unlike typical cases of private management, the passport was subsequently handed over to the Lao police, who acted as a guarantor of the arrangement. This involvement of state authorities ensured that Anita's mobility was restricted until private settlement could be negotiated with the injured passenger's family.

While Anita had technically violated existing traffic laws, the Lao police played only a minimal role in the formal legal proceedings, highlighting the dual role of the state. The Lao government acted as a formal guarantor of the private settlement arranged by the KRG, ensuring Anita's compliance and preventing her from evading responsibility. This reflects how the state reinforces its presence in the SEZ by integrating it into the national legal framework, while also allowing for flexible, ad hoc governance arrangements.

Both Wei Yuan's and Anita's experiences highlight how, despite the formalization of borders and traffic regulations, significant pockets of governance within the SEZ are still managed informally. Discretionary enforcement allows those with economic power to navigate the system more easily, while others face inconsistent treatment.

The tension between state vigilance and negotiation permeates several other facts of life within the zone. In the SEZ territory, the presence of the state manifests—to use Ong's expression—with "graduated" intensity and flexibility, in response to a differentiated human capital and different circumstances (Ong 2006, p. 7). Authorities' control over the Burmese fringe of the SEZ population illustrates this point.

5. The Burmese Workforce: A Case of Pragmatic Governance

The governance of Burmese labor in the GTSEZ reflects how the Lao state's broader project of state building intersects with capital accumulation. The very mechanisms employed to establish control—such as documentation system, selective enforcement, and the reliance on social networks—also create an environment of profound insecurity for the workers. This precarity is not only tolerated, but actively exploited by both the state and the private developer, maintaining a fungible, low-cost labor pool that serves their respective interests.

The Burmese community, which forms the largest pool of cheap, unskilled, or semi-skilled labor in the zone, is central to this strategy. These workers come from various parts of Myanmar, including the Wa region, the town of Tachileik, and the bigger city of Mandalay, and primarily occupy unskilled or semi-skilled positions in hospitality, construction, and maintenance. Burmese of Chinese descendance, fluent in Mandarin, can access slightly better roles in administration, while a minority have set small businesses. However, most live in precarious conditions, either in dormitories provided by the KRG or in the informal Burmese Village, an agglomerate of shacks at the margins of the zone. This village, home to approximately 40,000 regular and irregular workers during my fieldwork, is emblematic of the broader dynamics of control and insecurity.

The Lao state, in partnership with the KRG, experiments with a complex system of governance for these workers, mixing formal regulatory structures with flexible, often informal practices. Workers like Dai Min experience firsthand the insecurities that stem from this hybrid system. Dai Min arrived in the SEZ in 2010 from Myanmar's Irrawaddy region, initially finding work in construction through a friend's recommendation. When his employer abandoned the zone and never returned, Dai Min's survival depended on informal networks. "I started as construction worker," he explained, "but then my boss left and said he would be back. I waited for months, but he never returned. Without a contract or any family support, I had to rely on my friend to survive."[18]

This precarity, created by the absence of formal employment protection, forced Dai Min to continuously seek stability through informal means. Eventually he secured a job at the casino, once again through his social network. "I heard through my friend that the casino was recruiting workers, so I applied," he recounted. Then, his friend lost his life from a drug overdose, further marking Dai Min's experience with the harsh realities and dangers of life in the SEZ, deepening his sense of isolation and instability. Short of alternatives, Dai Min chose to stay. During one of his rare visits to Myanmar, he married and returned to the SEZ with his wife. A few months later, their son was born. "I was at work when he was born," Dai Min recalled. "When I got back to the village, everyone told me, 'Your son is born!' I felt like crying! I immediately went to the Lao hospital in the nearby town and spent the night there with my wife and my son."

Raising a child in the zone proved difficult and after a year, Dai Min's wife took their son back to her parents in Myanmar so she could continue working. "I am not sure how long we will be here for," he admitted, voicing the persistent uncertainty faced by workers in the zone.

This insecurity is not accidental; it is built into the governance structure of the zone. Unlike other communities, whose documentation is processed directly by the KRG, Burmese workers must navigate bureaucracy on their own. The formal mechanisms of control, such as residency permits and visa renewals, are designed in ways that create constant bureaucratic hurdles and financial burdens. A Wei, another Burmese worker, described this in detail,

> The document used to cost USD 19 per year. Now the maximum length of validity is six months, and it costs USD 76 each time we renew it. For Chinese workers everything is easier because the company [KRG] pays for it.[19]

These high costs and logistical barriers keep Burmese workers in a state of constant vulnerability. While Chinese workers receive employer support, Burmese workers must navigate the system independently, making their situation significantly more precarious. By capping the length of residence permits at six months—half the duration allowed for other nationalities—the state exerts control over their mobility, ensuring they remain dependent on the system. At the same time, the frequent renewals generate a steady stream of revenue for the Lao state through visa-processing fees, making the process both a mechanism of control and a source of profit.

The flexible governance system, which allows the Lao state to selectively enforce its regulation, is central to the management of the Burmese labor force. As in the case of border management, the collaboration between state and non-state actors is crucial to this process. This partnership is formalized through joint institutions that process work permits and manage labor mobility allowing the state to maintain control while accommodating the economic needs of the private developer. One such institutions is the "Golden Triangle Special Labour Service, Co Ltd.," established in 2016 at the entrance of the Burmese village to process work permits for undocumented workers. Operated by Lao officers, the office employs Burmese *huaqiao* (Burmese nationals with Chinese backgrounds) to assist in translating application instructions, which are only provided in Chinese. This arrangement smooths the bureaucratic process and serves as example of hybrid and pragmatic governance model that characterizes the SEZ.

The Lao state also relies on the KRG administrative offices to issue official communiqués (通知 *tongzhi*) posted across the SEZ in public spaces such as canteens, supermarkets, and billboards. These official documents seek to integrate migrant workers into formal employment structures. One such communiqué, n. 2391, released on 29 December 2017, emphasized the need to strengthen the management of laborers in the SEZ:

> All the Burmese citizens who are using a temporary transit permit, must be recruited in a working unit, and can apply for a 6-months working permit and residence permit.[20]

By mandating that all Burmese citizens be absorbed into formal work units, the Lao state ties their legal status to their employment. The document, translated into both Mandarin Chinese and Burmese, and bearing the stamp of the Lao central government, highlighted the concerted effort of state and developer in ensuring that every worker in the zone was properly accounted for.

The system of work units, while appearing as a formal mechanism, also played a crucial role in reinforcing the workers' vulnerability, making workers like A Wei and Dai Min dependent on their employment to keep their legal status. At the same time, these workers were forced into precarious work arrangements, with the constant threat of losing their jobs—and, thus, their residency—hanging over them.

The exploitation of the cross-border movements of vulnerable migrants to the advantage of both state and businesses is not a new phenomenon in the region.

Nicholas Farrelly (2012) has shown how the Thai government capitalizes on Burmese migration on the Thai–Burmese border to maintain an inflow of cheap labor despite the existence of a legal framework designed to curb the exploitation of human mobility. By examining the shortcomings of the Thai legislation regarding human trafficking in all its nuanced facets, Farrelly highlights a convenient misalignment between the Thai state's policies for managing Burmese cross-border mobility and its professed anti-trafficking rhetoric. A similar pattern emerges in the GTSEZ, where regulatory mechanisms are manipulated to maintain a low-cost labor force that benefits both the KRG and Lao authorities alike.

The second part of the Communiqué mentioned above evidences this point. By acknowledging the presence of foreign individuals without legal documents, it offers an ad hoc solution:

> All foreign individuals who do not possess any legal documents and entered the SEZ illegally […] can apply for a […] six-month working permit and residence permit (and pay the relative fees to avoid incurring in fines)[21]

This regulation, which effectively normalizes the illegal entry and residence of migrant workers within the SEZ, illustrates how the Lao state transforms legal problems into economic opportunities. Instead of strictly enforcing national immigration laws, the government creates a commercial pathway that allows "illegal" residents to regularize their status for free. The SEZ's Regulatory framework thus co-opts undocumented workers into a formal labor pool, ensuring a steady supply of cheap, exploitable labor that fuels both the Lao state-building project and the developer's profit-driven objectives.

The precarity and insecurity that workers like Dai Min and A Wei face, as byproducts of the formal governance system, are further solidified by the employment conditions, which exploit informal means to consolidate the situation of precarity. The wage system and the organization of workers' accommodation illustrate this point. The KR casino's wage system is closely tied to ethnicity. A Burmese casino worker of Chinese descent described:

> I came to the zone in 2009 and worked at the casino ever since. Every year the company [KRG] adds USD 13.50 to our salary, but the maximum increase has been capped to USD 68.50. If you don't rest for the whole month, then the company adds four days of salary. Every month, to get a normal basic salary you can rest for four days. But this is a new rule, until 2016 it used to be only two days of rest, and at the very beginning it was even worse, because we did not have any rest at all. If you worked for 30 days without days off, you could get 32 days-worth salary; but if you took two days off, the company would withdraw three days of your salary […] Now Chinese table-supervisors get USD 548, while Chinese dealers get USD 479.50. For the same roles Burmese Huaqiao as myself get respectively USD 300 and USD 340. Other Burmese croupiers get USD 300, while Lao nationals can work only as croupiers and each month get USD 260.

This ethnically stratified wage system highlights how ethnic identity is used as a tool for economic discrimination. Although the working hours comply with the 2016 Lao Labour Law, which sets a maximum of 48 h per week (Article 51), the disparities in pay between ethnic groups are stark and entrenched, confirming the system's coercive and discriminatory nature.

Alongside formal regulatory structures, informal networks play an equally important role in shaping workers' experience. For instance, Stella, a Burmese casino senior employee, explained that she was required to vouch for any new friend or contact she facilitated into a casino position and held responsible for their conduct at work. "If they make mistakes, we both could have our wages docked, or even be fired," she explained. This reliance on social ties for employment turns individual responsibilities into collective accountability, ensuring that workers police each other's behavior.

Despite the inequities in the system, some workers have managed to navigate the complex web of formal and informal governance. A Burmese card dealer, recounted, "I

wanted to reunite with my mother and bring her to the zone, but she had no documents and no employment. So, I came up with a story to secure the necessary paperwork and told the casino management that I needed support with my newborn baby." This kind of informal negotiation exemplifies how workers use the flexibility within the system to their advantage, though such strategies do not mitigate the broader environment of insecurity they face.

Similarly, the accommodation system within the SEZ also serves as a means of control and reinforces ethnic divisions. The KRG offers different types of housing, primarily dormitory-style rooms that accommodate 4–6 workers per room. Workers with families or couples can apply for family units, but access to these units is limited and often favors certain ethnic groups. A Burmese worker expressed frustration after waiting for a family unit for four years, while Chinese couples were approved ahead of him. "If you don't know the right people, it is hard to get anything here," he lamented, "I am still on the waiting list but after two years I have stopped asking."

Yet, KRG-provided accommodations are appealing to many Burmese workers because they are free and because Lao state authorities exercise less scrutiny in these spaces. In contrast, in the Burmese village where most of the Burmese population resides, local authorities periodically conduct raids, detaining undocumented workers, imposing fines, and repatriating individuals. One Burmese informant recounted:

> If you don't have the residence permit, you cannot work. When they [the Lao police] catch you without documents, you are forced to pay. They apprehended about 250 people today! They keep everyone in jail, 25–30 people in one room. A few years ago, the fee to liberate each person was USD 30. Now it is USD 90, and someone must act as guarantor for them. If no one volunteers to vouch for them, then they [the undocumented individuals] are repatriated to Myanmar. However, they typically come back later.[22]

This targeted policing, combined with the rapid rising of fines, serves as a means of establishing order but also as a way for the Lao government to profit from the vulnerabilities of migrant workers. In this sense, the informal mechanisms of governance—the social networks and the accommodation system—function alongside formal structures to maintain control and exploit the precariousness of Burmese workers.

This dual system of governance, blending formal and informal mechanisms, ensures that both the Lao state and the private developer benefit from a low-cost, compliant labor force. By enforcing flexible regulations and leveraging social networks to impose collective accountability, the state consolidates its authority while the developer maximizes profits. The Lao state's project of state-building and the KRG's economic objectives thus converge, perpetuating the insecurities of Burmese workers for mutual gain. This reflects what Mezzadra and Neilson (Mezzadra and Neilson 2013) call "differential inclusion" to describe a policy model which rests on uneven workers' mobility to exert social discipline and control, maintaining inclusion that is intentionally incomplete. The filtering power of border management, Mezzadra argues, fosters subordination, discrimination, and fragmentation (Balibar et al. 2012, p. 191). Similarly, the Laotian government adopts a regulatory system that filters mobility and leverages ethnic differences to support the state's economic goals within the SEZ. For Burmese workers like Dai Min and A Wei, this insecurity is both a byproduct and a tool of governance, keeping them highly exploitable. The state ad hoc management reinforces its presence in a key borderland while ensuring a steady supply of low-cost labor for the developer. In this way, insecurity is institutionalized as a means of control, serving the interests of both the state and private capital.

6. Contested Legitimacy, Controversies, and Dilemmas

The legitimacy of the GTSEZ has been fraught with scrutiny since its establishment, with critics questioning the nature of its casino-driven economy and its broader impact on regional governance, sovereignty, and social order. As early as 2011, Mr. Pattana Sittisombat, president of the Committee for the Economic Quadrangle had reportedly voiced

his worries to South Morning China Post (SMCP), arguing that a casino-centric economy was unlikely to mitigate the long-standing problem of narco-trafficking in the Golden Triangle. Rather than standing as a bulwark against the illicit economy, he feared that it would fuel money laundering and create a hub for other illegal activities (RFA 2017). These concerns have been echoed in regional and international media, which labeled the GTSEZ with epithets such as "Laos Vegas" (GOOD 2012), "The 'lawless' playground of Laos" (Chicago Tribune et al. 2015), and "Jungle Vegas" (SCMP 2015). Such framing emphasizes the blurred lines between legality and illegality within the zone, highlighting the governance challenges posed by its unique structure.

Journalist Sebastian Strangio (2016), in a report for Al Jazeera, described the GTSEZ as a "Chinese enclave transplanted in the tropical hills," underscoring its role as a symbol of China's growing economic footprint in Southeast Asia. Strangio's portrayal aligns with broader fears of Chinese imperialism, where projects like the GTSEZ—particularly under the Belt and Road Initiative—are viewed as mechanisms through which China extends its influence into neighboring countries. Similarly, The Economist critiqued SEZs in Laos, linking them to China's "go abroad" policy, suggesting that the GTSEZ is less about local economic development and more about the projection of Chinese hegemony under the guise of modernization and international cooperation (The Economist 2020).

The GTSEZ's casino operations further complicate matters. While gambling is illegal in Laos under national law (Vientiane Times n.d.), the government made an exception for the zone, framing the casino as a necessary concession to promote modernization. The situation escalated in January 2018, when the U.S. Treasury department labelled Mr. Zhao Wei's network as a "Transnational Criminal Organization," accusing it of involvement in money laundering and human- and narco-trafficking through its casino operations. This episode challenged the legitimacy of the development project. It intensified international scrutiny on the GTSEZ, raising serious concerns about the zone's role in criminal enterprises, and putting pressure on the Lao government to address the U.S. allegations. However, as previously mentioned, just days before these accusations came to light, the Lao government had publicly awarded Zhao Wei a development prize at the Kapok Flower Festival, signaling its support for his activities despite growing criticism.

Laungaramsri (2019) provides a pointed critique of the Lao government's silence on the U.S. allegations, arguing that its support for Zhao Wei reflects a tacit alignment with Chinese economic interests at the expense of Laos' own sovereignty. Laungaramsri frames this as "commodified sovereignty", where the state leverages its sovereign rights to attract investment (Laungaramsri 2015, p. 119). Anchoring this analysis to postcolonial discourse, she argues that these relationships endorse neo-imperial governance, with the GTSEZ representing a modern extension of China's imperial legacy (Laungaramsri 2019, p. 204).

Laungaramsri's analysis delves into the controversial practices of authoritarian dispossession disguised within the development rhetoric. While initial plans included relocation of multiple villages, only one—Ban Khuan—was relocated between 2011 and 2012 to the New Golden Triangle Village 新金三角村 *xin jinsanjiao cun*. The government justified the dispossession as progress, while Mr. Zhao promoted the new village as a form of Lao authentic lifestyle and as a commodity to be displayed for the tourist gaze and consumption. Mr. Zhao's narrative framed the relocation as result of his leadership, claiming perseverance had won over the villagers. "If you put your heart to it," he declared, "you can break up metal and rocks […] After two years of hardship, we have moved the God of these people."[23] This paternalistic rhetoric positions the state and developers as benevolent leaders guiding the "child-like" villagers towards progress, an outlook that veils the contentious dispossession process (China Talk 中国访谈 2011).

The New Golden Triangle Village, touted as "a model village in Laos", reflecting "the relationship between China and Laos" (GTSEZ Investment Guide n.d.), faced immediate structural issues. Poor construction quality, evident in cracked walks and leaky roofs after the first rainy season, disrupted the lives of the relocated villagers (Laungaramsri and Sengchanh 2018). The promised alternative jobs, such as a taxi company and three-

wheeled motorcycles, did not absorb the labor force as anticipated. Villagers received insufficient compensation. They also resisted Mr. Zhao's paternalism, viewing themselves not as "backward," but rather as proud heirs of Souvannakhomkham's ancient civilization (Laungaramsri 2019). By uncovering these criticalities, Laungaramsri provides a counter-narrative to the dominant development discourse around the GTSEZ.

Yet, Laungaramsri's critique does not fully account for the complexities of local resistance and adaptation within the GTSEZ. Scholars like Chamberlain (2007), High (2008), Petit (2008), Rigg (2012), and Singh (2012) have examined government resettlement strategies, highlighting how relocation processes often involve a complex interplay of coercion and consent (High 2008, p. 534). My own fieldwork demonstrates that, while the zone has undoubtedly exacerbated inequalities, it has also provided local communities with new opportunities for economic engagement. Villagers have found ways to participate in the zone's economy, whether by opening small businesses or leveraging the influx of Chinese workers and tourists to create new revenue streams. Emblematic of this complex tapestry of engagement was the story of Mia, a Lao woman in her 40s who had lived for 20 years in Thailand and worked as a pad Thai seller. Recently returned to her home village next to the SEZ, she refused to sell her property to Chinese investors. Instead, she studied Chinese and started her own food business, while also fantasizing about developing a tourist business to bring foreign visitors to nearby Lao villages where her friends and family lived.

Similarly, Laungaramasri's depiction of Laos as a "broker state", (Laungaramsri and Sengchanh 2018) minimizes the state's role, portraying it as mainly subservient to Chinese power and reducing its sovereignty to a mere commodity traded for economic gain. This characterization downplays the government's efforts to balance state agenda while managing both internal and external pressures. However, the Lao government's continued support of Zhao Wei can be interpreted through a pragmatic lens. As explored earlier, the GTSEZ is an integral part of the government's nation-building strategy, particularly in the borderlands, where state control has historically been weak. This endorsement was further confirmed on 1 October 2022, when the government awarded Mr. Zhao a medal of courage (RFA 2022). Hence, the government's reluctance to address the U.S allegations directly can be seen as a strategic decision to safeguard its broader modernization goals and protect the zone's reputation as a key site of economic growth. Once more, this dynamic reflects the complex balance that the Lao government maintains between appeasing foreign investors and asserting sovereignty over the zone.

Despite U.S. sanctions, during my fieldwork, I observed Lao police interventions to tackle illicit activities. There were reports by Radio Free Asia on substantial drug seizures in Bokeo province, where the SEZ is located (RFA 2023a). While this reflects the fact the region has not yet been sanitized, as the official narrative claims, it also underscores the state's continued commitment. Additionally, infrastructure projects such a port on the Mekong River and an airport have proceeded (RFA 2020), reflecting the government's commitment to using the SEZ as a tool for modernization, despite the legal and moral ambiguities surrounding its operations.

To portray the GTSEZ principally as an extension of what McNally (2012) defines as "Sino-capitalism" would also be reductive. McNally's concept highlights a state-driven capitalist model where informal networks and private investment serve China's interest. While Mr. Zhao's rhetoric is anchored in China's symbolic and economic power, as the slogans mentioned earlier suggest, the discussion on borders' formalization and workforce management shows how the GTSEZ reflects a hybrid space where Lao sovereignty and Chinese capital intersect, negotiating power and governance rather than simply ceding it to Chinese interests. Nor does the significant capital outflow from China, estimated at CNY 1 trillion (USD 144 billion) annually (The Economist 2022), automatically link to the financial influx into the Golden Triangle as an expression of Chinese expansion in the region. The complexity is heightened by the fact that the GTSEZ's casino operations contravene Chinese antigambling laws (Banks 2017, p. 17), which ban gambling activities both within China and abroad. Despite China's global economic ambitions through initiatives like the

BRI, gambling remains a clear red line for Chinese authorities. In 2003, China even deployed troops to shut down casinos in Mong La, Myanmar, after a high-ranking official's daughter lost CNY 1 million there (Xia 2003). In 2022 alone, Chinese police handled over 37,000 cross-border gambling cases (Xinhua News 2022) and worked with neighboring countries to combat drug-related crimes (China Daily 2023a), leading to the extradition of hundreds of fraud suspects from Laos, the Philippines, Indonesia, and Myanmar (China Daily 2023b). The GTSEZ has not been exempt from these enforcement efforts, with some KRG managers detained upon their return to China due to their casino involvement.[24]

In 2015, Chinese authorities, in cooperation with local Lao officials, shut down one of the GTSEZ's online casinos after scams affected Chinese citizens. These anti-gambling measures are complemented by increased regional security efforts, including joint patrols along the Mekong River by Laos, China, and Myanmar. In September 2023, China further solidified its commitment to regional security by entering an agreement with ASEAN to combat transnational crime, focusing on forced labor and online scams (UNODC 2023). This reflects the balancing act between the Chinese official anti-gambling stance and the economic realities in the region and within the GTSEZ.

In short, despite the legal and moral ambiguities, the Lao government remains committed to the SEZ as a tool for national development, while simultaneously navigating international scrutiny. While the new system engenders uneven power relationships between the state, private developers, and local actors, the experiences like those of A Wei, Dai Min, and Mia challenge the narrative of disempowerment, showing how individuals navigate the imperfections of the system to their own advantage.

The region's intricate dynamics, involving both Lao sovereignty and Chinese capital, reveal that the GTSEZ is more than a case of Chinese expansionism. It is a space where power is negotiated, and the state retains a measure of agency even as it seeks to attract foreign investment.

7. Rethinking State Governance in GTSEZ

The GTSEZ presents a distinct case of governance where sovereignty and capitalism are hybridized to create an experimental project which rests on both formal and informal management practices. Ong's definition of SEZs as "neoliberal enclaves" offers a starting point to think about these spaces as characterized by a unique blend of administrative freedom, investment incentives, and distinct labor markets that operate with significant autonomy from the host state (Ong 2006). In these zones, Ong suggests, market mechanisms begin to replace state authority as the primary mode of governance. The GTSEZ, however, does not entirely fit into this model. In the GTSEZ, state sovereignty is not fully relinquished but shared and reconfigured. The Lao government retains symbolic and regulatory control over the zone, while outsourcing some decision-making power to private actors. This sharing sovereignty disrupts the neat binaries of state versus market, public versus private, and local versus global, making the GTSEZ an experimental space where traditional forms of governance and capitalist expansion intersect in unpredictable ways.

This blending of public and private governance has been critiqued by scholars like Kearrin Sims (Sims 2017) and Alessandro Rippa (2019). Sims decries the casino economy as "predatory" and detrimental to wider societal interests (Sims 2017, p. 678) Meanwhile, Rippa interprets the GTSEZ as a strategic 'evasion of state power', a mechanism to circumvent traditional governance in favor of economic elites (Rippa 2019, p. 267). These perspectives challenge the GTSEZ's operational norms that disrupt the normative functioning of the Lao state, highlighting the divergence from the intended equitable modernization to a reality marked by stark power imbalances. These critiques expand on Ong's theory of neoliberal enclaves, highlighting the ways in which SEZs can exacerbate socio-economic disparities by privileging the interests of investors over those of local communities.

However, this paper complicates these views by highlighting how the Lao state remains actively involved in governance within the GTSEZ, even while collaborating with private actors like the KRG. Unlike the "predatory" or "state-evading" characterization,

the state continues to exert control through both formal and informal means, balancing its own interests with those of private investors. The accounts of Wei Yuan and Anita reveals how state mechanisms, such as selective enforcement and ad hoc governance, persist in shaping the power dynamics and labor conditions within the zone, thus complicating the notion that the GTSEZ operates solely in the interests of economic elites.

Similarly, the management of the Burmese workforce shows how the Lao state is actively involved in a complex system of governance that blends regulations with informal mechanisms, such as selective enforcement and leveraging social networks, to maintain control over the labor force. While this system exploits workers' vulnerabilities and remains morally questionable, it demonstrates a nuanced interaction between state power and private capital. It shows how the state's project of nation building is intertwined with economic objectives, challenging narratives of state power being circumvented entirely.

Pal Nyíri's concept of "post-national sovereignty" is more suitable in analyzing this dynamic. Exploring two SEZs on the Lao northwestern borderlands—Boten and the GTSEZ—Nyíri suggests that they represent a form of sovereignty that is vested not solely in the state but in private corporations, creating an environment where corporate actors wield significant authority. Nyíri's analysis of the GTSEZ highlights the ideological paradox at play: While Mr. Zhao mimics symbols of Chinese state power to legitimize his authority, the GTSEZ simultaneously promotes individual economic freedom that exists outside of state control (Nyíri et al. 2017). Through cultural events like the Kapok Flower Festival and the use of Chinese Communist Party slogans, the GTSEZ projects an image of modernization and progress. At the same time, by endorsing investors like Mr. Zhao, then, the Lao government leverages the development initiatives to rebrand the Golden Triangle, making this experimental governance a core part of its state-building strategy. This tension between state-led symbolism and capitalist experimentation disrupts the notion that the GTSEZ can be neatly categorized as either a neoliberal enclave or a state-driven development project.

This paradox is never fully reconciled, and it translates in the social and economic asymmetries of the zone. Rather than being entirely disempowered, however, local actors, such as workers and villagers, navigate the inconsistencies of this hybrid system to their own advantage. As I have demonstrated, while the state and developers exploit social networks to secure their respective interests, these same networks represent, for workers, a repository of information, social support, and even strategic resistance to the limitations of the zone. Similarly, Mia's story, like the experiences of many other local villagers, complicates the narrative of local disempowerment, showing how local actors can strategically engage with the zone's economic opportunities while resisting its more exploitative elements. This local agency further characterizes the GTSEZ as a site of negotiation, where state actors, private investors, and local communities constantly reconfigure power dynamics.

8. Conclusions

The GTSEZ epitomizes a unique experiment in governance in Laos, where traditional notions of sovereignty and governance are reconfigured to accommodate the needs of modern economic development. This paper has explored the multifaced interactions between the Lao government and non-state actors, recentralizing the Lao state's pivotal role in its nation-building process. Through the GTSEZ, Laos transforms its borderlands into gateways for international cooperation and economic innovation, leveraging the zone as a critical component of its national development strategy.

This view adds nuances to the perspectives that cast the GTSEZ as a domain of Chinese imperialism, by emphasizing the instability of Chinese investment projects and highlighting the proactive measures taken by the Lao government to address the zone's complexities. The government's flexible and pragmatic approach to integrating SEZs into the national development plan, managing borders, and regulating labor flows illustrates its commitment to navigating the intricate dynamics of power, authority, and economic interests.

Although governance within the GTSEZ appears inexact, fragmented, and incomplete, the zone emerges as a paradigmatic example of how relationships between the state, sovereignty, and territoriality are being reimagined to respond flexibly to both challenges and opportunities. Through this analysis, therefore, I hope to contribute to expanding the narratives of statecraft and nation-building in Southeast Asia, highlighting the GTSEZ's role in shaping modern governance strategies.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author due to ethical reasons.

Conflicts of Interest: The author declares no conflicts of interest.

Notes

1 Decree no 443/PM, Article 37.
2 KRG investors' brochure (fieldwork material).
3 Decree no 443/PM, Article 55.
4 Decree no 443/PM, Article 55.
5 Articles 58–59.
6 Article 135 of the Criminal Code.
7 SEZ, Introductory note to the Hall of Eternal Friendship, n.d.
8 Lao PDR, Promotional Video for SEZs, 2011.
9 A total of 15,287 jobs was created, of which 6,769 went to local workers (Lao PDR 2016, p. 27).
10 Article 13.
11 Article 2.
12 Decree no 443/PM, Article 3.
13 Article 2.
14 Article 82.
15 Fieldnotes, 2018, Interview with a Burmese informant.
16 Fieldnotes, 2018.
17 Fieldnotes, 2018.
18 Fieldnotes, 2018.
19 Fieldnotes, 2018.
20 GTSEZ Management Committee, Communique n. 2391, 29 December 2017.
21 GTSEZ Management Committee, Communique n. 2391, 29 December 2017.
22 Fieldnotes, 2018, interview with Burmese informant.
23 Interview with Mr. Zhao on China Talk, 2011
24 Fieldnotes, 2018, interview with casino manager.

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