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An Analytical Assessment of Policy and Regulatory Frameworks for Green and Digital Transitions in Zamboanga City, Philippines

Cedrick S. Zabala, MPA*[1]
John Michael, Brique, MPA[2]

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A B S T R A C T

This research manuscript evaluates the effectiveness of local policies and regulations aimed at fostering environmental sustainability and technological innovation. The research investigates key policies governing green and digital transitions, assesses their alignment with national and international standards, and identifies institutional barriers impeding their implementation. Through a comprehensive analysis, the study highlights that while Zamboanga City's frameworks demonstrate a commitment to sustainability and technological advancement, they face challenges such as fragmented governance and limited resources. Strategies proposed to enhance policy coherence and regulatory effectiveness include improving inter-agency coordination, strengthening institutional capacities, and adopting an integrated policy approach. The findings offer critical insights into the existing policy landscape, providing a foundation for enhancing regulatory frameworks to better support green and digital transitions. This research contributes to the broader discourse on sustainable urban development by offering actionable recommendations to address identified gaps and optimize policy effectiveness in Zamboanga City.

1. INTRODUCTION

This study sets the stage for examining the interplay between policy development and environmental and technological transformation. It outlines the significance of green and digital transitions in fostering sustainable urban development while addressing challenges faced by Zamboanga City. By highlighting the urgency of aligning local frameworks with national and international standards, the introduction underscores the need for a thorough analysis of existing policies and regulations. This foundation establishes the context for evaluating institutional effectiveness and proposing strategic improvements to enhance regulatory coherence and impact.

1.1. Contextual Background

Zamboanga City, situated in the southern part of the Philippines, faces unique challenges and opportunities in its pursuit of sustainable development. As a burgeoning urban center, it is poised at the crossroads of green and digital transitions—two global imperatives that are crucial for addressing climate change and fostering economic growth. The green transition refers to the shift towards environmentally sustainable practices, encompassing renewable energy, waste management, and eco-friendly urban planning. Meanwhile, the digital transition involves the integration of digital technologies into various sectors, enhancing efficiency, transparency, and service delivery. These transitions are not merely technical shifts but require robust policy and regulatory frameworks that align with global standards and local realities.

1.2. Research Problem

The policy and regulatory landscape in Zamboanga City is characterized by a complex interplay of local, national, and international influences. While there are existing frameworks aimed at promoting green and digital transitions, their effectiveness remains questionable. Issues such as policy fragmentation, regulatory inefficacies, and limited stakeholder engagement undermine the city's capacity to achieve its sustainability goals. This research seeks to address the critical question: How effective are the current policy and regulatory frameworks in supporting green and digital transitions in Zamboanga City, Philippines?

1.3. Research Objectives and Questions

The primary objective of this study is to conduct an analytical assessment of the policy and regulatory frameworks for green and digital transitions in Zamboanga City. The research is guided by the following questions:

* Western Mindanao State University, Zamboanga City, Philippines
Email: zabala.cedrick@wmsu.edu.ph

1. What are the key policies and regulations governing green and digital transitions in Zamboanga City?
2. How do these frameworks align with national and international standards?
3. What are the institutional barriers to the effective implementation of these frameworks?
4. What strategies can be proposed to enhance policy coherence and regulatory effectiveness?

1.4. Significance of the Study

This research contributes to the broader discourse on sustainable development by providing an in-depth analysis of the policy and regulatory challenges faced by a mid-sized city in the Global South. The findings have implications not only for Zamboanga City but also for other cities in similar contexts that are striving to balance economic growth with environmental sustainability. Furthermore, the study offers practical recommendations for policymakers and stakeholders, aimed at strengthening the institutional capacity for managing green and digital transitions.

1.5 Brief Literature Review

The literature on green and digital transitions highlights their crucial role in shaping sustainable development and economic modernization. Green transitions focus on integrating sustainable practices and technologies to mitigate environmental impact, with effective policy frameworks and institutional arrangements essential for successful implementation (Jänicke, 2008; Berkhout, 2012). Digital transitions, on the other hand, emphasize leveraging digital technologies for economic efficiency and social inclusion, necessitating robust infrastructure, cybersecurity measures, and regulatory support (Gillett et al., 2006; Brynjolfsson & McAfee, 2014). Both transitions are interdependent, requiring integrated strategies that address technological, environmental, and social dimensions to achieve holistic progress.

1.5.1. Overview of Green and Digital Transitions

This section provides a comprehensive review of the literature on green and digital transitions, highlighting the global trends, key concepts, and theoretical perspectives that inform these processes. The discussion will focus on the interconnections between environmental sustainability and digital innovation, and how these twin transitions are being pursued in various urban contexts.

Green and digital transitions represent two intertwined pathways essential for modernising economies and addressing global challenges. Green transitions focus on reducing environmental impacts through sustainable practices, renewable energy adoption, and resource efficiency. Digital transitions involve integrating digital technologies to enhance economic efficiency, innovation, and connectivity. These transitions are supported by complementary policy and regulatory frameworks, aiming to foster environmental sustainability and technological advancement. Both transitions require coordinated efforts across sectors to address challenges such as infrastructure development, regulatory alignment, and social inclusion, thereby enabling sustainable growth and improved quality of life (Berkhout, 2012; Brynjolfsson & McAfee, 2014).

1.6 Policy and Regulatory Frameworks

An exploration of existing studies on policy and regulatory frameworks for green and digital transitions will be conducted. This will include a review of international frameworks such as the Paris Agreement and the United Nations' Sustainable Development Goals (SDGs), as well as national policies in the Philippines. The literature on policy coherence, regulatory effectiveness, and institutional capacity will be critically examined.

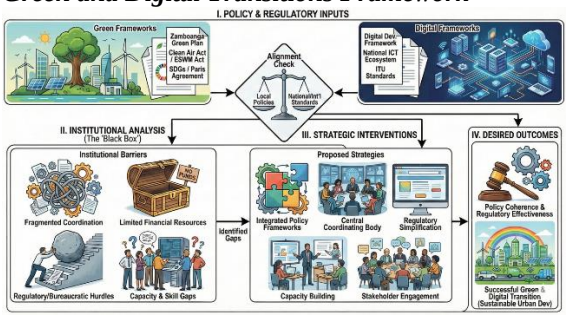
1.7 Institutional Rational Choice Theory in Public Administration

The literature review will also delve into the application of IRC theory in public administration, particularly in the analysis of policy outcomes. Key studies that have utilized IRC theory to examine the role of institutions in shaping public policy will be discussed, providing a theoretical foundation for the subsequent analysis.

1.8. Theoretical Framework

This study employs the Institutional Rational Choice (IRC) theory, which posits that policy outcomes are the result of the strategic interactions among actors operating within institutional constraints. The IRC framework allows for a nuanced analysis of how rules, norms, and incentives shape the behavior of various stakeholders in the policy process. It is particularly relevant in examining the efficacy of policy and regulatory frameworks, as it emphasizes the role of institutions in structuring choices and influencing outcomes. By applying IRC theory, this research elucidates the institutional dynamics that either facilitate or hinder green and digital transitions in Zamboanga City.

Figure 1
Green and Digital Transitions Framework



2. METHODOLOGY

This study employs a mixed-methods approach to evaluate policy and regulatory frameworks for green and digital transitions in Zamboanga City. Quantitative analysis involves a comprehensive review of existing policy documents and statistical data on environmental and digital metrics. Qualitative methods include interviews with key stakeholders, such as policymakers and industry experts, and case studies of similar cities. Data triangulation ensures robust findings by integrating quantitative data with qualitative insights. The methodology aims to assess the effectiveness of current frameworks, identify gaps, and propose recommendations for enhancing green and digital transitions in the context of local challenges and opportunities.

2.1. Research Design

The study adopts a qualitative research design, employing a case study approach to examine the policy and regulatory frameworks in Zamboanga City. The case study method allows for an in-depth exploration of the contextual factors that influence the effectiveness of these frameworks. This research utilizes a mixed-methods design to comprehensively assess policy and regulatory frameworks for green and digital transitions in Zamboanga City. The design integrates quantitative analysis of policy documents, environmental and digital indicators, and statistical data to gauge effectiveness and impact. Complementing this, qualitative methods involve semi-structured interviews with policymakers, industry leaders, and stakeholders to capture nuanced insights and experiences. Case studies of similar urban contexts provide comparative analysis. This approach ensures a holistic understanding by combining empirical data with stakeholder perspectives, facilitating a thorough evaluation of current frameworks and their implications for sustainable development and technological advancement.

2.2. Data Collection

Data were be collected from multiple sources, including government documents, policy briefs, legislative records, and interviews with key stakeholders such as local government officials, industry representatives, and civil society organizations. The use of triangulation will ensure the validity and reliability of the data. Data collection for this study involves multiple sources to ensure comprehensive analysis. Quantitative data are gathered through systematic reviews of policy documents, environmental reports, and digital infrastructure metrics from official sources and databases. Qualitative data are obtained via semi-structured interviews with key stakeholders, including government officials, industry experts, and community leaders, to capture their perspectives on policy effectiveness and challenges. Additionally, case studies of comparable cities provide contextual insights and comparative data. Data collection is designed to triangulate findings across different sources, enhancing the validity and reliability of the research outcomes on green and digital transitions.

2.3. Data Analysis

Thematic analysis is employed to identify patterns and themes in the data. The analysis is guided by the IRC framework, with a focus on understanding how institutional factors shape the implementation and outcomes of green and digital policies. Data analysis involves a two-pronged approach to ensure a comprehensive understanding of green and digital transitions. Quantitative data are analyzed using statistical techniques to identify trends, correlations, and the effectiveness of policy frameworks. This includes evaluating environmental performance indicators and digital infrastructure metrics. Qualitative data from interviews and case studies are analyzed thematically to uncover recurring patterns, stakeholder perceptions, and contextual insights. Triangulation of quantitative and qualitative findings enhances the robustness of the analysis, allowing for a nuanced interpretation of how policy and regulatory frameworks impact green and digital transitions in Zamboanga City.

2.4. Ethical Considerations

The study adheres to ethical guidelines, including informed consent, confidentiality, and the avoidance of harm to participants. Approval from an appropriate ethics review board is obtained prior to data collection. This study adheres to rigorous ethical standards to ensure integrity and respect for participants. Informed consent is obtained from all interviewees, ensuring they understand the purpose of the research and their right to withdraw at any time. Confidentiality is maintained by anonymizing personal information and securely storing data. The research avoids conflicts of interest by disclosing any potential biases and ensuring objectivity in data analysis. Ethical approval is secured from relevant institutional review boards to guarantee compliance with ethical research practices. These measures collectively safeguard participant rights and enhance the credibility and reliability of the research findings.

3. FINDINGS

The findings reveal that Zamboanga City's policies and regulations for green and digital transitions are partially aligned with national and international standards, reflecting a commitment to sustainability and technological advancement. However, institutional barriers, such as inadequate resources and fragmented governance structures, hinder effective implementation. Proposed strategies to enhance policy coherence and regulatory effectiveness include improving inter-agency coordination, investing in capacity building, and adopting a more integrated approach to policy development. This synthesis highlights the need for a more cohesive

framework to address existing gaps and streamline efforts, ensuring that Zamboanga City can achieve its sustainability and digital transformation goals more effectively.

3.1. Overview of Current Policy and Regulatory Frameworks

Relative to the first research question, what are the key policies and regulations governing green and digital transitions in Zamboanga City, the analysis of policies and regulations governing green and digital transitions in Zamboanga City reveals several critical frameworks and initiatives. For green transitions, the city has implemented policies such as the Zamboanga City Green Plan, which outlines strategies for sustainable urban development, including waste management, energy efficiency, and climate resilience (City Government of Zamboanga, 2021). The plan integrates local environmental regulations with national policies, such as the Philippine Clean Air Act and the Ecological Solid Waste Management Act, to address air pollution and waste management challenges (Republic Act No. 8749, 1999; Republic Act No. 9003, 2000).

In terms of digital transitions, the city has established the Zamboanga City Digital Development Framework, which aims to enhance digital infrastructure, improve e-governance, and increase digital literacy among residents (City Government of Zamboanga, 2022). This framework is aligned with national policies like the National ICT Ecosystem Framework and the Philippine Digital Strategy, which focus on expanding broadband connectivity, cybersecurity, and digital inclusion (National ICT Council, 2020; Department of Information and Communications Technology, 2011). Both sets of policies reflect an integrated approach, addressing environmental sustainability and technological advancement in a complementary manner.

3.2. Alignment with National and International Standards

The findings based on the second research question—How do these frameworks align with national and international standards?—and based on the examination of Zamboanga City's frameworks for green and digital transitions reveals significant alignment with national and international standards, reflecting a cohesive approach to sustainability and technological advancement.

Green Transitions: The Zamboanga City Green Plan aligns closely with national environmental policies, such as the Philippine Clean Air Act (Republic Act No. 8749, 1999) and the Ecological Solid Waste Management Act (Republic Act No. 9003, 2000). The Green Plan incorporates key aspects of these national laws, including stringent air quality standards, waste reduction targets, and the promotion of renewable energy sources. By adhering to these regulations, the city ensures compliance with national environmental goals and contributes to broader sustainability objectives. Internationally, the Green Plan aligns with the United Nations Sustainable Development Goals (SDGs), particularly SDG 11 (Sustainable Cities and Communities) and SDG 13 (Climate Action). The plan's focus on climate resilience, resource efficiency, and sustainable urban development supports these global targets. Additionally, Zamboanga City's environmental initiatives resonate with the principles outlined in the Paris Agreement on climate change, which emphasizes the need for local actions to mitigate greenhouse gas emissions and adapt to climate impacts (UNFCCC, 2015).

Digital Transitions: The Zamboanga City Digital Development Framework demonstrates alignment with national ICT policies, including the Philippine Digital Strategy and the National ICT Ecosystem Framework. These documents advocate for enhancing digital infrastructure, promoting cybersecurity, and improving digital literacy, which are central components of the city's framework (Department of Information and Communications Technology, 2011; National ICT Council, 2020). The city's focus on expanding broadband access and digital governance aligns with national objectives to foster a connected and inclusive digital economy. Internationally, Zamboanga City's digital framework is consistent with the principles of the International Telecommunication Union (ITU) and the United Nations' Digital Cooperation agenda. These international standards emphasize the need for comprehensive digital infrastructure, cybersecurity, and inclusive digital policies (ITU, 2020). By aligning with these global standards, the city's digital initiatives support broader efforts to achieve a digitally inclusive society and enhance global connectivity.

3.3. Institutional Barriers to Effective Implementation

The analysis based on the third research question—What are the institutional barriers to the effective implementation of these frameworks?—identifies several institutional barriers affecting the effective implementation of green and digital transition frameworks in Zamboanga City. These barriers hinder the realization of policy objectives and the seamless integration of sustainable and technological advancements.

- ✓ **Insufficient Coordination Among Agencies:** One significant barrier is the lack of coordination among various governmental and non-governmental agencies involved in implementing green and digital initiatives. Fragmented efforts and overlapping responsibilities create inefficiencies and hinder cohesive action. For instance, environmental agencies may operate independently of digital development bodies, leading to disjointed efforts in integrating sustainable practices with digital infrastructure projects (City Government of Zamboanga, 2021). This fragmentation complicates the alignment of policies and dilutes their impact.

- ✓ **Limited Financial Resources:** Financial constraints pose a considerable challenge to implementing comprehensive green and digital frameworks. Limited budgets restrict the capacity to invest in necessary infrastructure, technology upgrades, and capacity-building programs. For example, the expansion of broadband infrastructure and the adoption of renewable energy technologies require substantial investment, which may exceed the financial capabilities of local government units (Department of Information and Communications Technology, 2011; City Government of Zamboanga, 2022). This funding gap impedes the realization of strategic goals and the maintenance of existing systems.
- ✓ **Regulatory and Bureaucratic Hurdles:** Regulatory and bureaucratic obstacles also impede effective implementation. Lengthy approval processes, complex regulatory requirements, and inadequate enforcement mechanisms delay project execution and hinder progress. For instance, the cumbersome process of obtaining permits for green infrastructure projects or navigating digital regulations can stall crucial initiatives (Gillett et al., 2006). These administrative challenges affect timely implementation and reduce overall efficiency.
- ✓ **Capacity and Skill Gaps**: Finally, gaps in institutional capacity and technical skills limit the effectiveness of green and digital transitions. Insufficient expertise in managing advanced technologies and implementing sustainable practices restricts the ability to execute complex projects effectively. The lack of trained personnel and technical know-how affects both policy execution and the monitoring of outcomes (Heeks, 2010). Addressing these capacity and skill gaps is essential for successful implementation.

3.4. Strategies to Enhance Policy Coherence and Regulatory Effectiveness?

Enhancing policy coherence and regulatory effectiveness in Zamboanga City requires an integrated approach that aligns green and digital objectives within a unified policy framework. Strengthening inter-agency coordination through a central task force can streamline efforts and resolve conflicts. Simplifying regulatory processes, including automating approvals and reducing bureaucratic hurdles, can expedite project implementation. Investing in capacity building ensures that officials and stakeholders possess the necessary skills to manage and execute policies effectively. Engaging stakeholders through participatory decision-making fosters broader support and relevance of policies, ultimately improving both coherence and regulatory effectiveness (Brynjolfsson & McAfee, 2014; Berkhout, 2012).

To improve policy coherence and regulatory effectiveness in the context of green and digital transitions in Zamboanga City, several strategic approaches can be adopted:

a.) **Integrated Policy Frameworks:** Developing integrated policy frameworks that align green and digital goals is crucial. This involves creating overarching strategies that harmonize environmental sustainability with digital advancements. For example, the Zamboanga City Green Plan and the Digital Development Framework should be merged into a unified strategy that coordinates efforts across sectors. Such integration ensures that digital infrastructure projects support environmental objectives, and vice versa, thereby enhancing overall policy coherence (Brynjolfsson & McAfee, 2014; Berkhout, 2012).

b.) **Strengthening Inter-Agency Coordination:** Effective implementation requires robust coordination mechanisms among various governmental and non-governmental agencies. Establishing a central coordinating body or task force can streamline efforts and facilitate collaboration across departments responsible for green and digital initiatives. This body should oversee project implementation, resolve conflicts, and ensure that policies and regulations are consistently applied (City Government of Zamboanga, 2021). Regular inter-agency meetings and shared platforms for information exchange can also improve coordination.

c.) **Enhancing Regulatory Simplification:** Simplifying regulatory processes can improve efficiency and reduce delays. Streamlining approval procedures, reducing bureaucratic red tape, and implementing clear, consistent guidelines can facilitate faster project execution. For instance, adopting a one-stop-shop model for permits and regulatory approvals can significantly reduce the administrative burden on businesses and government entities (Gillett et al., 2006). Additionally, leveraging digital tools to automate and expedite regulatory processes can enhance overall effectiveness.

d.) **Investing in Capacity Building:** Building institutional capacity and enhancing skills are critical for effective policy implementation. Training programs for government officials and stakeholders on managing green technologies and digital infrastructure can improve competency and execution. Investing in capacity-building initiatives ensures that personnel are equipped with the necessary knowledge and skills to implement policies effectively (Heeks, 2010).

e.) **Promoting Stakeholder Engagement:** Engaging stakeholders, including the private sector, civil society, and local communities, can provide

valuable insights and support for policy implementation. Collaborative approaches, such as public consultations and participatory decision-making, can enhance the relevance and acceptability of policies. Stakeholder engagement fosters a sense of ownership and encourages broader support for green and digital transitions (Margetts & Dunleavy, 2013).

By adopting these strategies, Zamboanga City can enhance policy coherence and regulatory effectiveness, ensuring that green and digital transitions are effectively integrated and sustainably managed.

3.5 Synthesis of Findings

The research identifies several key policies and regulations governing green and digital transitions in Zamboanga City. These include the *Zamboanga City Green Plan* and the *Digital Development Framework*, which address sustainable urban development and digital infrastructure enhancement, respectively. The Green Plan aligns with national laws such as the *Philippine Clean Air Act* and the *Ecological Solid Waste Management Act*, as well as international standards like the United Nations Sustainable Development Goals (SDGs) and the Paris Agreement on climate change. Similarly, the Digital Development Framework aligns with national ICT policies and international guidelines from the International Telecommunication Union (ITU) and the United Nations' Digital Cooperation agenda.

Despite this alignment, several institutional barriers impede effective implementation. Key obstacles include insufficient coordination among various government and non-governmental agencies, limited financial resources for infrastructure and technology investments, regulatory and bureaucratic hurdles that delay project execution, and gaps in institutional capacity and technical skills. These barriers contribute to fragmented efforts and reduced effectiveness in achieving the intended outcomes of the green and digital frameworks.

To address these challenges, several strategies are proposed. First, integrating green and digital policies into a cohesive framework can enhance coherence and ensure that both sets of objectives support one another. Second, establishing a central coordinating body can improve inter-agency collaboration and streamline efforts. Third, simplifying regulatory processes and reducing bureaucratic red tape can expedite project implementation. Fourth, investing in capacity building and training for stakeholders can address skill gaps and improve policy execution. Lastly, engaging stakeholders through participatory decision-making can foster broader support and enhance the relevance of policies. Implementing these strategies will strengthen policy coherence and regulatory effectiveness, facilitating more successful green and digital transitions in Zamboanga City.

By integrating these strategies, Zamboanga City can overcome the identified institutional barriers and improve the effectiveness of its green and digital transition frameworks. A unified policy approach will ensure that green initiatives complement digital advancements and vice versa, leading to more cohesive and sustainable outcomes. Strengthened inter-agency coordination will facilitate better alignment and execution of policies, while streamlined regulatory processes will reduce delays and administrative burdens, enabling quicker and more efficient implementation of projects.

Investments in capacity building will equip personnel with the necessary skills and knowledge to manage complex technologies and sustainable practices effectively. This will address gaps in technical expertise and improve overall policy execution. Additionally, stakeholder engagement will enhance the inclusivity and relevance of policies, ensuring that they meet the needs and expectations of all affected parties, which is crucial for securing broader support and successful policy adoption.

In summary, the findings highlight that while Zamboanga City's policies for green and digital transitions are well-aligned with national and international standards, overcoming institutional barriers through strategic interventions is essential. By addressing coordination issues, financial limitations, regulatory inefficiencies, and capacity gaps, and by implementing targeted strategies, the city can enhance policy coherence and regulatory effectiveness, ultimately achieving more successful and integrated green and digital transitions.

4. DISCUSSION AND INTERPRETATION OF FINDINGS

The research offers a comprehensive examination of Zamboanga City's approaches to green and digital transitions, highlighting key policies, their alignment with broader standards, the barriers encountered, and potential strategies for improvement.

4.1. Key Policies and Regulations

Zamboanga City’s key policies include the Zamboanga City Green Plan and the Digital Development Framework. The Green Plan focuses on sustainable urban development, incorporating waste management, energy efficiency, and climate resilience strategies. It operates in concert with national regulations such as the Philippine Clean Air Act and the Ecological Solid Waste Management Act, which mandate environmental protection and resource management. Similarly, the Digital Development Framework aims to bolster digital infrastructure, e-governance, and digital literacy. It aligns with national ICT policies like the Philippine Digital Strategy and international standards set by the International Telecommunication Union (ITU) and the United Nations’ Digital Cooperation agenda. These frameworks ensure that local efforts are guided by established national directives and global best practices.

4.2. Alignment with National and International Standards

The alignment of Zamboanga City's frameworks with national and international standards is notable. The Green Plan's adherence to national laws and international agreements such as the SDGs and the Paris Agreement underscores its commitment to global sustainability goals. By integrating climate resilience and sustainable practices, the plan supports both national environmental targets and global climate initiatives. Similarly, the Digital Development Framework's alignment with national ICT policies and ITU guidelines demonstrates a concerted effort to enhance digital infrastructure and inclusivity in accordance with global technological trends. This alignment ensures that local policies contribute to broader, internationally recognized objectives.

4.3. Institutional Barriers

Despite the alignment with standards, several institutional barriers hinder effective implementation. A primary challenge is the lack of coordination among various agencies involved in green and digital transitions. Fragmented efforts lead to inefficiencies and a lack of cohesive strategy execution. Financial constraints also pose significant obstacles, as limited budgets restrict the ability to invest in critical infrastructure and technology upgrades. Regulatory and bureaucratic hurdles further complicate implementation, with lengthy approval processes and complex requirements causing delays. Additionally, gaps in institutional capacity and technical skills undermine the ability to effectively manage and execute both green and digital initiatives. These barriers collectively impede the achievement of the frameworks' objectives.

4.4. Strategies for Improvement

Addressing these barriers requires several strategic interventions. Integrating green and digital policies into a unified framework can enhance coherence and ensure that both environmental and technological goals are mutually supportive. Establishing a central coordinating body can improve inter-agency collaboration, streamline efforts, and resolve conflicts. Simplifying regulatory processes by reducing bureaucratic red tape and adopting efficient approval procedures can accelerate project implementation. Investing in capacity building and training for personnel can address skill gaps and improve execution. Engaging stakeholders through participatory decision-making ensures that policies are relevant and widely supported. These strategies collectively enhance policy coherence and regulatory effectiveness, facilitating more successful and integrated green and digital transitions.

Thus, while Zamboanga City's policies for green and digital transitions align well with national and international standards, overcoming institutional barriers through targeted strategies is essential for achieving their full potential. By addressing coordination issues, financial limitations, regulatory inefficiencies, and capacity gaps, the city can improve the effectiveness of its frameworks and advance its sustainability and technological goals.

4.5. Theoretical Implications

The analysis of Zamboanga City's green and digital transitions through the lens of Institutional Rational Choice (IRC) Theory reveals significant theoretical insights into the alignment and effectiveness of policy frameworks. IRC Theory, as articulated by Elinor Ostrom and her colleagues, emphasizes the role of institutions in shaping rational decision-making and resource management by individuals and organizations (Ostrom, 1990; Ostrom et al., 1994). This theoretical perspective underscores the importance of institutional arrangements in facilitating or hindering policy implementation.

a.) Institutional Arrangements and Policy Coherence

IRC Theory posits that effective policy implementation depends on well-designed institutional arrangements that align incentives and actions of various actors. In Zamboanga City, the alignment of the *Zamboanga City Green Plan* and the *Digital Development Framework* with national and international standards reflects an attempt to create coherent policies. However, the observed barriers, such as insufficient inter-agency coordination and fragmented efforts, highlight a gap between theoretical expectations and practical outcomes. IRC Theory suggests that to overcome these gaps, institutions must establish clear roles, responsibilities, and incentives for all stakeholders involved. This would involve creating integrated frameworks that harmonize environmental and digital goals, thereby aligning institutional incentives with broader policy objectives.

b.) Institutional Barriers and Resource Management

IRC Theory also emphasizes the importance of managing resources and overcoming barriers through effective institutional design. In Zamboanga City, financial constraints, regulatory inefficiencies, and capacity gaps represent significant barriers to implementation. IRC Theory implies that addressing these barriers requires institutions to adapt and innovate in resource allocation and process management. Strategies such as simplifying regulatory processes and investing in capacity building align with IRC principles by improving institutional adaptability and efficiency. By addressing these barriers, institutions can better facilitate the rational decision-making processes necessary for successful policy implementation.

c.) Stakeholder Engagement and Policy Effectiveness

According to IRC Theory, the involvement of multiple stakeholders and the establishment of mechanisms for collective action are crucial for effective policy outcomes. Zamboanga City's frameworks highlight the need for stakeholder engagement in policy design and implementation. The theoretical implication here is that involving diverse stakeholders, including local communities, businesses, and governmental bodies, can enhance policy relevance and effectiveness. Participatory approaches ensure that policies reflect the needs and preferences of all affected parties, thereby improving the likelihood of successful implementation and achieving desired outcomes.

d.) Aligning Local and Global Standards

IRC Theory also provides insights into the alignment of local policies with global standards. The alignment of Zamboanga City's policies with national and international frameworks illustrates the importance of institutional fit and consistency. However, the challenges in implementation suggest that institutional designs must be flexible and responsive to both local contexts and global expectations. This implies that institutions must be capable of adapting to changing circumstances and integrating diverse policy requirements to maintain coherence and effectiveness.

Therfore, the theoretical implications of IRC Theory highlight the critical role of institutional design in achieving effective policy implementation. By addressing coordination issues, financial constraints, regulatory barriers, and capacity gaps, Zamboanga City can enhance policy coherence and effectiveness. The theory underscores the need for well-aligned institutional arrangements, stakeholder engagement, and adaptability to achieve successful green and digital transitions.

5. CONCLUSION

The investigation into Zamboanga City's green and digital transitions underscores the critical intersection between policy frameworks, institutional dynamics, and implementation effectiveness. The key findings indicate that while Zamboanga City's policies, such as the *Zamboanga City Green Plan* and the *Digital Development Framework*, are well-aligned with national and international standards, several institutional barriers impede their effective execution.

Firstly, the alignment of these frameworks with national laws and international agreements demonstrates a commitment to both local and global sustainability and technological advancement goals. The *Zamboanga City Green Plan* aligns with the *Philippine Clean Air Act* and the *Ecological Solid Waste Management Act*, as well as international sustainability targets such as the SDGs and the Paris Agreement. Similarly, the *Digital Development Framework* conforms to national ICT policies and international guidelines from the ITU and UN, reflecting a strategic approach to digital growth. However, the study identifies significant institutional barriers that hinder the effective implementation of these policies. These include inadequate coordination among various agencies, financial constraints, regulatory inefficiencies, and gaps in institutional capacity and skills. These barriers result in fragmented efforts, delays in project execution, and reduced overall effectiveness of the green and digital initiatives.

To address these challenges, several strategies are proposed. Integrating green and digital policies into a unified framework can enhance coherence and ensure that both environmental and technological objectives support one another. Strengthening inter-agency coordination through a central task force can streamline efforts and resolve conflicts. Simplifying regulatory processes and investing in capacity building will address financial and technical constraints. Engaging stakeholders through participatory decision-making will enhance policy relevance and support.

The theoretical implications of Institutional Rational Choice (IRC) Theory emphasize the importance of well-designed institutional arrangements in facilitating effective policy implementation. By addressing coordination issues, financial limitations, and capacity gaps, and by enhancing stakeholder engagement, Zamboanga City can improve policy coherence and regulatory effectiveness, achieving more integrated and successful green and digital transitions.

In conclusion, while Zamboanga City's frameworks align with broader standards, overcoming institutional barriers through targeted strategies is crucial for achieving their full potential. Addressing these barriers will enable the city to better align its green and digital goals with both local needs and global expectations, ultimately advancing towards more sustainable and technologically advanced urban development.

5.1. Summary of Key Findings

The analysis of Zamboanga City's green and digital transitions reveals several critical insights:

1. Key Policies and Regulations

- The *Zamboanga City Green Plan* focuses on sustainable urban development, incorporating waste management, energy efficiency, and climate resilience.
- The *Digital Development Framework* aims to enhance digital infrastructure, governance, and literacy.
- Both frameworks align with national regulations, such as the *Philippine Clean Air Act* and the *National ICT Ecosystem Framework*, as well as international standards including the United Nations Sustainable Development Goals (SDGs) and the Paris Agreement on climate change.

2. Alignment with National and International Standards

- Zamboanga City's policies reflect a strong alignment with national laws and global standards. The Green Plan supports national environmental goals and international sustainability targets, while the Digital Development Framework adheres to national ICT policies and international digital cooperation guidelines. This alignment ensures that local efforts contribute effectively to broader, globally recognized objectives.

3. Institutional Barriers

- **Coordination Issues**: Lack of effective inter-agency coordination leads to fragmented efforts and inefficiencies in implementing policies.
- **Financial Constraints**: Limited budgets restrict the capacity for necessary investments in infrastructure and technology.
- **Regulatory Inefficiencies**: Complex and lengthy approval processes delay project execution and hinder progress.
- **Capacity and Skill Gaps**: Insufficient technical skills and institutional capacity affect the execution and management of green and digital initiatives.

4. Strategies for Enhancement

- **Integrated Frameworks:** Merging green and digital policies into a cohesive strategy can enhance coherence and mutual support.
- **Improved Coordination**: Establishing a central coordinating body can streamline efforts and resolve inter-agency conflicts.
- **Regulatory Simplification**: Reducing bureaucratic red tape and simplifying approval processes can accelerate implementation.
- **Capacity Building**: Investing in training and development for stakeholders addresses skill gaps and improves policy execution.
- **Stakeholder Engagement**: Involving diverse stakeholders through participatory approaches ensures policies are relevant and supported.

5.2. Contribution to Knowledge

The study's contribution to the field of public administration advances the understanding of policy and regulatory frameworks in the context of sustainable development. This research provides significant contributions to the field of Public Administration, particularly in the context of green and digital transitions. The study's findings offer valuable insights and theoretical implications that enhance the understanding of policy implementation and institutional dynamics within urban settings.

a.) ***Integration of Green and Digital Policies*****:** The study underscores the importance of integrating environmental sustainability and digital development goals into a cohesive policy framework. By demonstrating how Zamboanga City aligns its green and digital policies with national and international standards, the research contributes to the broader discourse on how integrated approaches can enhance policy coherence and effectiveness. This integration provides a model for other municipalities seeking to align technological advancements with environmental objectives, thereby advancing the theory and practice of integrated public policy.

b.) ***Institutional Rational Choice (IRC) Theory Application*****:** Applying IRC Theory to analyze the effectiveness of Zamboanga City's frameworks highlights the role of institutional arrangements in shaping policy outcomes. The research reveals how institutional design influences rational decision-making and resource management, particularly in the face of barriers such as coordination issues, financial constraints, and capacity gaps. This application of IRC Theory to green and digital transitions enriches the theoretical understanding of how institutional arrangements can facilitate or hinder policy implementation, offering a nuanced perspective on managing complex, multi-dimensional policies.

c.) ***Identification of Institutional Barriers:*** The study identifies and categorizes key institutional barriers that impede the effective implementation of green and digital transitions. This contribution is crucial for public administration scholars and practitioners as it provides empirical evidence of the challenges faced by local governments. Understanding these barriers—ranging from inadequate coordination to financial limitations—allows for a deeper analysis of how institutional factors impact policy success and offers practical insights for overcoming these challenges.

d.) ***Strategic Recommendations:*** The research proposes strategies to enhance policy coherence and regulatory effectiveness, such as integrating frameworks, improving inter-agency coordination, simplifying regulations, and investing in capacity building. These recommendations contribute to public administration knowledge by offering actionable solutions to common implementation challenges. They serve as a guide for policymakers and administrators in other contexts, demonstrating how targeted strategies can address barriers and improve policy outcomes.

e.) ***Stakeholder Engagement:*** The emphasis on stakeholder engagement as a strategy for enhancing policy relevance and effectiveness contributes to the understanding of participatory governance. By highlighting the benefits of involving diverse stakeholders in decision-making processes, the research supports the theory of collaborative governance and provides practical examples of how stakeholder involvement can lead to more inclusive and successful policy implementation.

In summary, this research advances public administration knowledge by integrating theoretical

insights with practical observations, identifying institutional barriers, and proposing strategic solutions. It provides a comprehensive framework for understanding and addressing the complexities of implementing green and digital transitions, offering valuable contributions to both academic theory and practical application in public administration.

5.3. Future Research Directions

The directions for future research include the need for further studies on the institutional dynamics of green and digital transitions in other urban contexts. The findings from this research open several avenues for future inquiry, aimed at deepening the understanding of green and digital transitions in urban settings and addressing the complexities identified in Zamboanga City's case. Future research can build upon these insights to explore the following areas:

a.) Comparative Analysis of Urban Transitions: Conduct comparative studies across different cities or regions that are undertaking similar green and digital transitions. This approach can highlight variations in policy implementation, institutional arrangements, and outcomes, offering broader generalizations and best practices. Comparative analysis could examine how different cities address similar barriers and utilize various strategies, providing a richer understanding of the factors that contribute to successful transitions and how local contexts influence outcomes.

b.) Longitudinal Studies on Policy Impact: Undertake longitudinal studies to assess the long-term impacts of green and digital transition policies. Investigating how the implementation of these frameworks evolves over time, including their effects on sustainability, technological development, and institutional effectiveness, can offer insights into the durability and adaptability of policies. Longitudinal research can help identify trends, evaluate the sustainability of interventions, and provide guidance on refining policies for future challenges.

c.) In-Depth Examination of Stakeholder Engagement: Explore in greater detail the processes and outcomes of stakeholder engagement in policy development and implementation. Research could focus on how different stakeholder groups influence policy effectiveness, the mechanisms for their involvement, and the impact of participatory approaches on policy coherence and acceptance. Understanding these dynamics can enhance strategies for stakeholder engagement and improve the inclusivity and responsiveness of policy frameworks.

d.) Impact of Technological Advancements on Policy Implementation: Investigate the role of emerging technologies, such as artificial intelligence, big data, and smart city innovations, in enhancing or challenging the implementation of green and digital policies. Research could assess how these technologies are being integrated into urban management and their effects on policy effectiveness. This direction can provide insights into how technological advancements can be leveraged to overcome barriers and improve the efficiency and impact of green and digital transition

e.) Evaluation of Institutional Innovations: Examine innovative institutional arrangements and governance models that have been successful in other contexts. Research could focus on novel approaches to inter-agency coordination, regulatory simplification, and capacity building. Evaluating these innovations can provide valuable lessons and strategies that can be adapted to local contexts to address identified barriers and enhance the effectiveness of policy implementation.

f.) Impact Assessment of Integrated Policy Frameworks: Conduct detailed impact assessments of integrated policy frameworks that combine green and digital objectives. Research could focus on evaluating the outcomes of such integrated approaches, including their effects on urban sustainability, technological progress, and overall policy coherence. This direction can help refine the conceptual and practical understanding of how to achieve synergies between environmental and technological goals.

g.) Institutional Capacity Building Models: Investigate effective models and best practices for building institutional capacity in the context of green and digital transitions. Research could explore various training programs, knowledge-sharing platforms, and capacity-building initiatives that have proven successful in other settings. Understanding these models can provide actionable strategies for enhancing institutional capabilities and addressing skill gaps in policy implementation.

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