

Research Article

Policy Capacity Influencing Factors in The Makassar City Government to Become a Zero Carbon City

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Abstract.

Public policy capacity plays a crucial role in efforts to achieve zero emissions, with success depending on the effectiveness of policies designed and implemented by the government. This study highlights factors that influence the policy capacity of Makassar City, to become a low-carbon city. Through a qualitative approach, this study collected data from in-depth interviews with 24 key informants and city development plan documents, to explore the extent to which existing policy capacity supports the transition to zero emissions. The results show that factors such as policies and regulations, institutional structures, inter-agency coordination, human resource capacity, budget, cross-sectoral cooperation, supervision, program synchronization, public involvement, and technology are all interrelated, and influence the government's ability to achieve a zero carbon city. The successful implementation of carbon emission reduction policies requires an integrated approach that strengthens all these elements. Therefore, building policies and regulations, increasing coordination, and maximizing public involvement are key to achieving sustainable environmental goals and improving people's quality of life.

Keywords: public policy capacity, carbon emission reduction, low-carbon city

1. Introduction

The policy towards zero emissions in Makassar City is a strategic step taken by the local government to respond to the increasing threat of climate change and the environmental impacts of urban economic activities. As one of the largest cities in Indonesia, Makassar has an important role in achieving the national target of reducing greenhouse gas (GHG) emissions and the transition to more sustainable development. These emission reduction efforts are realized through various low-carbon development programs, more efficient waste management, and increasing the use of renewable energy.

According to data from Makassar city government documents, a significant increase occurred in the potential for reducing GHG emissions from 2019 to 2022. It was recorded that the potential for reducing GHG emissions in Makassar City increased from 1,607.463

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tons of CO₂ eq in 2019 to 8,194.35 tons of CO₂ eq in 2022. Based on reporting in the BAPPENAS AKSARA Application, from 52 total low-carbon development action activities that have been implemented in Makassar City, the total cumulative emission reduction potential until 2023 reached 74,751.31 tons of CO₂ eq, contributing 2.54% to the achievements of South Sulawesi Province. In 2023, the achievement of the potential for reducing GHG emissions in Makassar City was recorded at 74,751.30529 tons of CO₂ eq. Although Makassar City is not included in the areas with the highest potential for reducing GHG emissions such as Sidrap, North Luwu, or Selayar, its position as the provincial capital and center of major economic and social activities provides great potential in influencing GHG emissions in South Sulawesi.

The total cumulative emission reduction potential of South Sulawesi Province reached 2,947,000 Tons of CO₂ eq with 2,873 low-carbon development actions that have been implemented. Makassar City contributed 2.54% or around 74,751.3 Tons of CO₂ eq with 50 action activities that have been implemented. Gowa Regency contributed 0.21% (6,222.73 Tons of CO₂ eq), Maros Regency 0.03% (941.82 Tons of CO₂ eq), and Takalar Regency 0.02% (516.12 Tons of CO₂ eq). The sources of GHG emissions in Makassar City come from the energy sector, such as fuel combustion in power plants, transportation, households, manufacturing, and the agriculture and fisheries sectors. In the AFOLU sector, emissions come from agricultural land management and the livestock sub-sector, with a significant increase in 2019 and 2020. Waste emissions come from landfills at the Tamangapa TPA and household liquid waste. In the IPPU sector, emissions are generated from the use of lubricants, aluminum production, and the use of sodium carbonate in the food and beverage industry.

The importance of public policy capacity in pursuing zero emissions is very important because the success of achieving zero emissions targets depends heavily on the effectiveness of policies designed and implemented by the government. Policy capacity includes the ability of government institutions to formulate, implement, and monitor policies that support the transition to low-carbon development. In this context, strong policy capacity is needed to address the technical, economic, social, and political challenges that arise in efforts to reduce emissions.

Policy capacity to address greenhouse gas emissions (GHG) varies across the world, influenced by the context and experience of each country. In the European Union, the success of the emissions trading system (ETS) depends on strong institutional capacity for effective management. [1], Meanwhile in China, increasing the use of renewable energy faces challenges in institutional capacity and human resource development. [2]&

[3]. In the United States, variation in state-based approaches suggests that proactive policies can strengthen the ability to reduce emissions. [4]; [5]. Meanwhile, developing countries like Bangladesh face challenges in institutional capacity and funding for effective adaptation policies [6] Strengthening capacity at all levels of government, as well as international support, is essential to achieving effective carbon emission reduction goals, given that each country has unique challenges that require policies tailored to the local context [7].

Study at Germany [8] and Norway [9], shows that public policies that successfully promote zero emissions are supported by strong capacity in terms of long-term planning, support for green technologies, and clear economic incentives for the private sector and society. Germany, for example, with its *Energiewende* (energy transition) program, has succeeded in reducing carbon emissions significantly through massive investments in renewable energy and energy efficiency. [10] This success shows that strong policy capacity and high political commitment play a major role in achieving climate targets. In contrast, countries with low policy capacity, such as some developing countries, face obstacles in implementation, often due to lack of resources, weak regulatory frameworks, and resistance from industrial sectors that still rely on fossil fuels. [11].

In the context of Makassar City, this study is important because it provides knowledge on the extent to which existing policy capacity can support the transition to zero emissions. This city, as the center of economy and social activities in South Sulawesi, faces major challenges in managing emissions resulting from rapid urbanization, transportation, and industry. If public policy capacity is not strong enough, efforts to achieve zero emission targets can be hampered, and negative impacts on the environment and public health will continue to increase. This study will explore how factors influence the capacity of zero emission policies by the city government.

2. Methods

This article is conducted by collecting qualitative data through in-depth interviews with 24 key informants from both policy makers who are compared with documents in the Makassar city development plan to find data related to policies related to handling zero emissions. The interview quotes presented are only the most appropriate quotes and represent the reality found after the data processing process. The data collected is processed through a triangulation process to test the validity of the data. After that, categorization and thematic analysis are carried out to categorize field findings. The

final stage, the data is interpreted according to the policy capacity study area to then draw conclusions based on existing variables.

3. Results and Discussion

The data presented through the research results were conducted by looking at the efforts to implement carbon emission reduction policies in Makassar City, by considering various important aspects in their implementation. By using document studies, in-depth interviews with key informants and various implementation analysis techniques. This analysis covers various factors, ranging from the clarity of policy targets to the technical and managerial capacity of implementers in the field. In addition, external conditions such as economic growth and support for green technology also influence the results of the achievement. In addition, the influence of various interest groups, both government, society, and the industrial sector, is an important factor in determining how effectively the policy is implemented. These indicators provide an overview of the challenges and opportunities faced in efforts to achieve carbon emission reduction targets. The results are presented in the following table

The table provides an evaluation of various aspects of carbon emission reduction policies in Makassar City. In the indicator of clarity of goals and targets, it was found that although carbon emission reduction goals have been set, specific targets such as the percentage of emission reduction per sector have not been clearly detailed. This causes a lack of synchronization between goals and implementation in the field, where many actions do not focus on reducing emissions in priority sectors.

From a socio-economic perspective, rapid economic growth is a barrier to carbon emission reduction efforts. Increased industrial activity and the development of environmentally unfriendly infrastructure are further exacerbating the situation. Although green technology is available, the adoption of this technology is still limited due to budget issues and inadequate supporting infrastructure.

Support from interest groups also plays an important role in policy implementation. Local governments provide strong political support, but the lack of coordination between sectors is an obstacle. Civil society groups also show interest in emission reduction policies, but their participation is limited due to lack of socialization. On the other hand, several large industries show resistance, especially in the energy and

TABLE 1: Analysis of the implementation of zero emission policies in the city of Makassar.

Indicators	Measured Parameters	Scale (1-5)	Findings
Clarity of Policy Goals and Objectives	Level of clarity in carbon emission reduction goals	3	The goals for emission reduction are clear, but specific targets (e.g., percentage reduction per sector) have not been fully detailed and communicated to implementers.
	Consistency between goals and implementation	2	The implementation of policies is not fully aligned with the initial goals, as most actions on the ground do not focus on emissions reduction in priority sectors.
Socio-economic and Technological Variables	Impact of economic conditions (growth vs emissions)	4	Economic growth hampers emissions reduction due to increased industrial activity and infrastructure development that is not fully environmentally friendly.
	Impact of green technology (innovation & adoption)	3	Environmentally friendly technologies are available but have not been optimally adopted, primarily due to budget constraints and lack of supporting infrastructure.
Support from Stakeholder Groups	Political support from local government	4	There is strong support from the government; however, coordination among sectors is lacking.
	Support from civil society (environmental organizations)	3	Civil society groups show interest, but participation is still low due to a lack of understanding and socialization of the programs.
	Resistance from large industries (key economic sectors)	4	Some large industries show resistance to policy implementation, particularly in the energy and transportation sectors.
Implementation Capacity	Implementers' skills (technical competence)	3	Technical limitations of local implementers lead to slow implementation of carbon emission reduction measures.
	Experience and managerial capability	2	Lack of experience in green project management makes policy implementation less directed and often hindered.
	Availability of resources (funding, infrastructure)	2	Funding and infrastructure to support carbon emission reduction are still minimal, especially in areas far from urban centers.
Monitoring and Enforcement	Strength of the monitoring system	2	Regular monitoring is lacking, leading to non-compliance with standards and emission reduction targets.
	Level of enforcement of sanctions for violations	1	Violations are not accompanied by effective sanctions, resulting in many businesses and agencies failing to comply with emission reduction regulations.

Source, processed from primary data, (2024)

transportation sectors, which are one of the biggest challenges in implementing this policy.

In terms of implementation capacity, limited technical competence and managerial experience at the implementing level are the main inhibiting factors. In addition, the availability of resources such as funds and infrastructure to support emission reduction is still very limited, especially in areas far from city centers.

Policy monitoring and enforcement are also important concerns. The existing monitoring system is not strong enough, so that emission reduction standards and targets are not consistently met. Worse still, enforcement of sanctions for violations is very weak, causing non-compliant business actors and agencies to not receive effective consequences, thus hampering the achievement of policy targets.

3.1. Factor Affecting

Description of various factors that influence the effectiveness of carbon emission reduction policy implementation. Several factors that are of primary concern are policies and regulations, institutional structures, inter-agency coordination, and human resource capacity and budget. The results of the study indicate several key factors, namely;

First, Policies and Regulations show that policies for carbon emission reduction, such as RAD-GRK (Regional Greenhouse Gas Action Plan), have been designed, but their implementation faces obstacles, mainly due to weak supervision and evaluation. Existing policies cannot run optimally due to lack of follow-up in the field. Second, Institutional Structure refers to the governance of government institutions involved in this policy. Although the institutional structure has been formed, there are still obstacles in the form of a lack of integration and coordination between the various parts involved, which causes policy implementation to not run synchronously. Third, Inter-agency Coordination is essential in the implementation of cross-sector policies, but the results of the study show that coordination between government institutions is often weak. Each agency implements its own policies without good coordination with other agencies, thus hampering the achievement of holistic emission reduction goals.

Fourth, Human Resource Capacity is also an important factor influencing policy implementation. It was found that many government officials and staff lack the technical understanding needed to formulate and implement low-carbon policies. This has led to delays and shortcomings in the implementation of environmentally-based programs. Fifth, Budget and Funding are one of the main obstacles in the implementation of this policy. Although there are green programs initiated, special budgets for these projects have not been fully allocated. The allocation of funds for emission reduction

is still limited to projections, without concrete funding. Sixth, Cross-Sector Cooperation involving the private sector, communities, and non-governmental institutions is important to support policy implementation. However, although there are several partnerships with the private sector, incentives offered to environmentally friendly companies are still absent. This makes cross-sector collaboration less than optimal.

Seventh, Policy Supervision is a weak point in the capacity of this policy. The monitoring and evaluation process is not carried out routinely, which causes planned policies to often not run according to target. The inability to carry out consistent supervision leads to non-compliance with regulations. Eighth, Program Synchronization between government agencies is also a prominent problem. Cross-sector programs are often not synchronized and run independently, due to differences in priorities and lack of coordination between the agencies involved.

Ninth, Public Involvement in the formulation and implementation of policies is also still very limited. Public participation is only carried out in the form of consultation, and not in the form of active participation, so that public input is often not the main consideration in the policies made. And tenth, Lastly, the Technology and Data used to monitor emissions and air quality have not been applied evenly. The use of this suboptimal technology has made monitoring of emission reduction policies not run well in all regions, so that there is no valid data to measure the achievement of the policy. The factors that influence the capacity of emission reduction policies in the city of Makassar are presented in the following table.

Furthermore, the relationship between factors is presented in the following network diagram.

The network diagram above shows the factors that influence policy capacity, with the solid blue line indicating strong relationships and the dashed red line indicating weak relationships. Factors such as policies and regulations, institutional structures, inter-agency coordination, human resource capacity, budget, and technology influence each other in shaping policy capacity. Weak relationships, such as between inter-agency coordination and program synchronization, indicate areas that need improvement to strengthen policies towards a Zero Carbon City.

TABLE 2: Factors Affecting Policy Capacity Towards Zero Emissions in Makassar City.

Factor	Research Findings
Policy and Regulation	Policies such as RAD-GRK exist, but their implementation is often hindered by a lack of oversight.
Institutional Structure	The institutional structure is in place, but coordination among divisions is often poorly integrated.
Inter-agency Coordination	Inter-agency coordination is often weak; cross-sector policies sometimes operate independently.
Human Resource Capacity	Government officials and staff often lack technical understanding related to low-carbon policies.
Budget and Funding	Specific budgets for green projects have not been allocated and are still projected.
Cross-sector Collaboration	There are partnerships with the private sector, but incentives for environmentally friendly companies are still limited.
Policy Oversight	Routine monitoring is not always conducted, causing some policies to not meet their targets.
Program Synchronization	Many programs lack synchronization, primarily due to differing priorities among agencies.
Public Engagement	Public involvement is still limited to consultations rather than active participation in the policy process.
Technology and Data	Emission monitoring technology and air quality data have not yet been uniformly implemented.

Source: Processed from primary data, (2024)

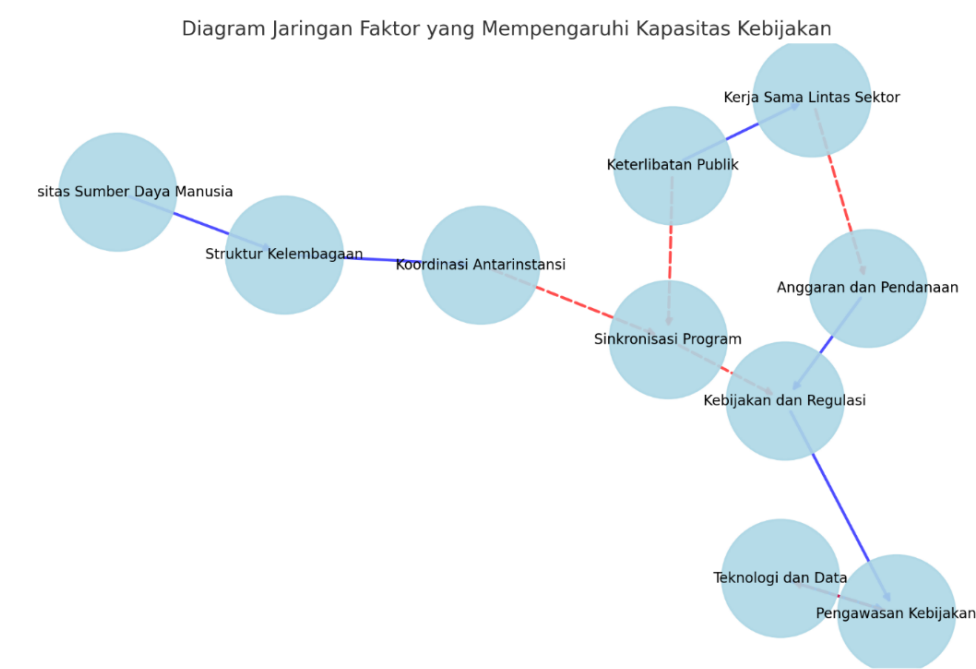


Figure 1: Network diagram of relationships between factors that influence policy capacity.

Source: Processed from primary data, (2024).

3.2. Policy and Regulation and Institutional Structure

Good policies and regulations cannot function effectively without the support of a strong and coordinated institutional structure. In this context, Institutional Theory states that the structures and processes in public institutions greatly influence the effectiveness of policy implementation. For example, the Regional Action Plan for Emission Reduction (RAD-GRK) has been designed as a strategic step to reduce carbon emissions. However, the reality shows that suboptimal implementation often occurs due to lack of supervision. This is in line with the concept of “institutional features” which shows that organizations that do not have clear oversight mechanisms will face difficulties in achieving policy objectives.

The ambiguity in the roles and responsibilities of the government institutions involved is also an inhibiting factor. Within the framework of Institutional Accommodation Theory, asynchrony between institutions can lead to inefficiency and lack of integration in policy implementation. This theory highlights the importance of collaboration and communication between institutions to create synergy in achieving common goals. Without good cooperation, each institution tends to operate in a silo, resulting in policies that cannot be implemented properly.

In addition, the Network Theory approach explains that the success of public policies often depends on the network of interacting actors. The lack of synchrony between agencies creates gaps in these networks, which hinder the flow of information and resources needed to implement policies effectively. In the context of RAD-GRK, this means that emissions reduction efforts can be hampered by a lack of coordination between agencies that should be working together to implement environmental programs.

3.3. Inter-Agency Coordination and Program Synchronization

Inter-agency coordination is one of the key elements in implementing cross-sectoral policies. In this context, Coordination Theory emphasizes that the effectiveness of public policies is greatly influenced by how well various government institutions can work together. Weak inter-agency coordination often causes emission reduction policies and programs to run separately, without the necessary alignment. This disharmony can create duplication of efforts and even conflicting priorities among sectors that should collaborate to achieve common goals.

From the perspective of Inter-Agency Relations Theory, interaction and cooperation between institutions are needed to achieve effective results in implementing public policies. This theory emphasizes that the success of cross-sectoral policies depends on the ability of institutions to communicate well and align their goals. Without a clear coordination mechanism, existing programs will not be able to support each other, and may even hinder the achievement of optimal results.

For example, in emission reduction policies, various sectors such as energy, transportation, and industry need to work together to reduce carbon emissions effectively. However, without good coordination, each sector may develop its own strategy that is not integrated. This not only results in wastage of resources but also creates confusion in program implementation. Furthermore, Network Theory is also relevant here, as it emphasizes the importance of collaboration between different actors in the governance system. Inter-agency coordination can be seen as a network of interactions that allows for the exchange of information, resources, and best practices. When agencies work within this network, they can create synergies that support more effective policy implementation.

Therefore, program synchronization is very important to ensure that cross-sectoral policies do not overlap and can support the achievement of the same goals. Steps such as the establishment of an inter-agency coordination forum, the development of effective communication mechanisms, and the alignment of policy agendas need to be taken to overcome this challenge. Thus, it is hoped that existing programs can run harmoniously and support each other, so that emission reduction policies can achieve optimal results.

3.4. Human Resource Capacity and Policy Oversight

The ability of human resources to formulate and implement policies has a direct impact on the effectiveness of policy oversight. In this context, Human Resource Theory emphasizes that the development of individual competencies and skills is essential to achieving organizational goals. Particularly in policy oversight, the lack of training and capacity development of government officials results in limited technical understanding of low-carbon policies. This leads to ineffective oversight, where policies are not implemented according to the targets set. Competency Theory is also relevant in explaining this relationship. This theory states that the competencies possessed by human resources greatly affect organizational performance. In this case, officials who do not have a

deep understanding of low-carbon policies will have difficulty in carrying out effective oversight. They may not be able to recognize inconsistencies in policy implementation or provide appropriate solutions to problems that arise.

On the other hand, Organizational Learning Theory emphasizes the importance of training and development in improving human resource capabilities. Strengthening HR capacity through technical training should be a priority to improve the quality of oversight. Good training will provide government officials with the knowledge and skills needed to conduct deeper policy analysis, understand oversight mechanisms, and identify problems that may arise during implementation.

Furthermore, the Institutional Capacity Theory also shows that the quality of policy oversight depends not only on individuals, but also on the systems and structures that support human resource development. Therefore, strengthening human resource capacity must be integrated with improvements to existing oversight systems and mechanisms. This includes providing access to government officials to attend relevant training, strengthening networks between institutions, and creating a learning culture within the organization. Thus, to improve the quality of oversight, strengthening human resource capacity through technical training must be a priority. Investment in developing the skills and competencies of government officials will not only improve the effectiveness of policy oversight but will also contribute to the achievement of broader policy goals, especially in the context of carbon emission reduction and environmental sustainability.

3.5. Budget and Funding and Technology and Data

Limited budgets and funding hinder the adoption of modern technologies needed for real-time emissions monitoring and reporting. In this context, the Resource Constraints Theory explains that organizations often operate within the constraints of available resources, including funds, manpower, and technology. When budgets are inadequate, the ability to adopt and implement the necessary monitoring technologies is severely limited. This limitation not only impacts the effectiveness of emissions monitoring but also the ability of governments to make evidence-based decisions. These budget constraints create gaps in accurate data collection, which in turn affects the quality of information used to formulate policies. Furthermore, the Access to Resources Theory highlights the importance of access to external funding, such as private sector investment or support from international agencies, to overcome the constraints faced.

Inequality in the adoption of monitoring technologies across regions is often due to a lack of adequate investment. In this regard, the theory suggests that organizations need to form strategic partnerships and seek alternative funding sources to enhance their technological capabilities. Without adequate access to funding sources, the implementation of improved technologies in emissions monitoring will be difficult to achieve, and this can result in ineffective policies and weak oversight of carbon emissions. Thus, the relationship between limited budget and monitoring technology capabilities shows how resource limitations can hinder the effectiveness of environmental management.

3.6. Cross-Sector Collaboration and Public Engagemnet

The successful implementation of emission reduction policies does not only depend on the government, but also requires the active participation of the private sector and civil society. The Multi-Sector Partnership Theory explains that collaboration between various stakeholders, including the government, private sector, and civil society, is essential to achieve common goals, such as carbon emission reduction. In this context, cross-sector cooperation can create the synergy needed to support green initiatives, where the private sector has great potential to contribute through sustainable practices and technological innovation. However, the lack of incentives for companies implementing green practices still hinders the optimal contribution of the private sector. Without adequate incentives, companies may be reluctant to invest in green technologies or change their business practices, which negatively impacts the achievement of emission reduction targets.

Public involvement is also a crucial factor in creating a sense of ownership of the policies being implemented. The Public Participation Theory emphasizes that involving the public in the process of formulating and implementing policies can not only increase support and participation, but also create policies that are more inclusive and relevant to the needs of the community. When the public feels involved in decision-making, they tend to be more supportive and committed to existing policies. Therefore, this finding phenomenon shows that to achieve success in reducing emissions, it is important to strengthen incentives for the private sector and increase public involvement in the policy process. Thus, the combination of cross-sector collaboration and community participation can create an ecosystem that supports the implementation of more effective and sustainable emission reduction policies.

4. Conclusion

Factors such as policies and regulations, institutional structures, inter-agency coordination, human resource capacity, budget, cross-sector cooperation, supervision, program synchronization, public involvement, and technology are interrelated and influence the capacity of the Makassar City government to achieve a Zero Carbon City. The successful implementation of carbon emission reduction policies requires an integrated approach that strengthens all of these elements. Strengthening policies and regulations through good monitoring mechanisms, improving inter-agency coordination, and developing human resource capacity is key. In addition, maximum public involvement and the use of appropriate technology will support the achievement of sustainable environmental goals. Synergy between these factors is essential to achieving a Zero Carbon City and improving the quality of life of the community in the long term.

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