Evaluating the Impact of Sister City Cooperation between Bandung and Kawasaki on Environmental Sustainability

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ABSTRACT
This research provided an in-depth analysis of the role of paradiplomacy practiced by the Government of South Sulawesi Province in enhancing agricultural exports to Egypt. The study utilized a conceptual framework integrating Paradiplomacy and International Trade, focusing on the impact of paradiplomacy policies on export volumes. Results indicated that the Government of South Sulawesi Province engages in the form of paradiplomacy termed global paradiplomacy, acting as a facilitator in international trade. Effective strategies for promoting exports included personal selling, public relations through webinars and training sessions, and participation in trade exhibitions. The crucial role of regional governments in boosting agricultural export volumes supported by efforts in infrastructure development and service improvements. The application of global paradiplomacy enabled the Government of South Sulawesi Province to autonomously establish trade relations and expand market access to Egypt, leading to a significant increase in agricultural exports. This study offered a comprehensive overview of how paradiplomacy practices can positively impact regional agricultural exports, emphasizing the successful export promotion strategies and their outcomes. The effectiveness of paradiplomacy is fostering regional economic growth through international trade expansion.

Keywords: Paradiplomacy, Sister City, Export Promotion, Agricultural Trade, International Trade, Bandung, Kawasaki

ABSTRAK

Kata Kunci: Paradiplomasi, Sister City, Promosi Ekspor, Perdagangan Pertanian, Dagang Internasional, Bandung, Kawasaki
1. Introduction

Climate change, as defined by Law No. 31 of 2009 on Meteorology, Climatology, and Geophysics, refers to alterations in climate patterns caused directly or indirectly by human activities, leading to the thinning of the atmospheric layer over specific periods (UNEP, 2023). This phenomenon has escalated into a global crisis, significantly altering weather patterns and adversely impacting various human activities across multiple sectors. The primary human activities contributing to this crisis include deforestation, which reduces the Earth's capacity to absorb carbon dioxide; air pollution from industrial emissions and vehicle exhaust; and improper waste management, which leads to increased greenhouse gas emissions (Tim, 2022). Since the 1970s, environmental issues have garnered increasing attention on the international stage. The 1972 United Nations Conference on the Human Environment in Stockholm marked a pivotal moment, bringing together countries worldwide to address environmental challenges and seek collaborative solutions. This event underscored the importance of global cooperation and the active participation of nations, organizations, and communities in mitigating the environmental impacts that threaten human survival (Pujayanti, 2012).

Indonesia, a nation characterized by its extensive maritime boundaries, is particularly vulnerable to the impacts of climate change. Rising sea levels and the associated risks of flooding and land erosion pose significant threats to the country’s coastal areas (World Bank, 2023). Additionally, Indonesia faces numerous environmental challenges, such as deforestation, biodiversity loss, air and water pollution, and inadequate waste management. As a developing country, Indonesia often requires the expertise and technological advancements from more developed nations to address these issues effectively. One of the notable collaborations aimed at enhancing environmental management in Indonesia is the sister city partnership between Bandung and Kawasaki. This form of cooperation, known as sister city relationships, involves agreements between local governments from different countries, allowing them to independently pursue mutual benefits and regional development, as supported by the Law on Regional Autonomy enacted in 2004 and 2014 (Chambers and Partners, 2023).

The sister city cooperation between Bandung and Kawasaki, established in 2015, is rooted in the shared historical experiences of both cities. Both Bandung and Kawasaki have undergone significant transformations, rebuilding from periods of destruction to become modern, resilient urban centers. This historical context has fostered a strong foundation for collaboration, particularly in addressing pressing environmental issues. From 2017 to 2020, the partnership saw the implementation of various initiatives focused on improving environmental sustainability. These initiatives included advanced solid and liquid waste management systems, efforts to enhance air quality, the promotion of energy efficiency, and the development of sustainable transportation technologies. These programs were designed to leverage Kawasaki’s technological expertise and Bandung’s local knowledge to create effective and sustainable environmental solutions (Rabbani & Hayat, 2022).

This study aims to evaluate the effectiveness of the sister city cooperation between Bandung and Kawasaki in the domain of environmental sustainability. By thoroughly examining the implementation processes and outcomes of the cooperative initiatives, this research seeks to provide a comprehensive understanding of how such international
collaborations can contribute to enhancing environmental management and promoting regional development. The findings of this study are expected to offer valuable insights into the strategies and practices that can be adopted by other regions facing similar environmental challenges, thereby contributing to the broader discourse on sustainable urban development and international cooperation.

2. Conceptual Framework

In this study, two primary theoretical frameworks were utilized to analyze the effectiveness of the sister city cooperation between Bandung and Kawasaki in addressing environmental sustainability: Paradiplomacy and Effectiveness Theory. These frameworks were interlinked and provide a comprehensive approach to understanding the mechanisms and outcomes of international and local government collaborations.

2.1. Paradiplomacy

Paradiplomacy refers to the international activities undertaken by sub-national governments, such as cities and regions, to establish cooperative relationships with other sub-national entities or even with state and non-state actors. This concept emerged in the 1980s, introduced by Panayotis Soldatos, who coined the term by combining "parallel" and "diplomacy" to describe such decentralized diplomatic engagements (Mukti, 2013). Paradiplomacy was further developed by Ivo Duchacek into three distinct forms:

1. Transborder Regional Paradiplomacy: Cooperation activities between sub-state actors located in close geographical proximity.

2. Transregional Paradiplomacy: Collaboration between sub-state actors within the same larger region.

3. Global Paradiplomacy: Diplomatic cooperation between sub-state actors that are geographically distant and belong to different regions.

According to Mukti (2013), paradiplomacy in Indonesia has evolved with reference to Law No. 2 of 1999 on regional autonomy, which was later amended in 2004 and 2014. These laws allow regions to engage in international cooperation to enhance public welfare through efficient and effective public service delivery. This framework provides a lens to examine how Bandung and Kawasaki's sister city cooperation fits within the broader scope of global paradiplomacy, focusing on environmental initiatives.

2.2. Effectiveness Theory

Effectiveness Theory is concerned with assessing the success of a program or plan in achieving its intended outcomes. According to Prasetyo Budi Saksono, effectiveness is measured by the extent to which the output meets or exceeds the expected results based on the inputs provided (Tysara, 2022). Richard M. Steers' criteria for effectiveness include goal achievement, integration, and adaptation, emphasizing the importance of achieving the program’s objectives (Siagian, 2011). Arthur G. Gedeian and other scholars highlight that effectiveness focuses on the results and impacts of actions taken. It involves assessing whether a program has met its desired targets and objectives, considering benchmarks
such as program success, goal achievement, participant satisfaction, input-output ratios, and overall goal attainment (Sutarjo & Nurlia, 2022). Key criteria for measuring program effectiveness, as outlined by Campbell and Annas (2017), include:

1. Punctuality: Implementing the program within the stipulated timeframe.
2. Human Resources: Selecting and deploying qualified personnel.
5. Correct Distribution of Funds: Using resources efficiently.
6. Absence of Deviations: Maintaining adherence to program targets.
7. Monitoring and Evaluation: Continuously assessing the program’s progress and outcomes.

These criteria are essential for understanding how effectively the Bandung-Kawasaki sister city initiatives have been implemented and whether they have achieved their environmental goals.

2.3. Application of the Framework

This research framework will be used to analyze the effectiveness of the Bandung-Kawasaki sister city cooperation by examining the following aspects:

1. Initiation and Implementation: Investigating how the partnership was established and the specific environmental programs implemented.
2. Evaluation of Goals and Outcomes: Assessing whether the cooperative efforts have met the predefined environmental objectives.
3. Operational Efficiency: Evaluating the use of resources, human capital, and the adherence to timelines.
4. Sustainability and Impact: Analyzing the long-term sustainability and broader impacts of the cooperative initiatives on environmental management.

By applying these frameworks, the study will provide a comprehensive analysis of the effectiveness of the sister-city cooperation, offering insights into the successes, challenges, and best practices that can inform future international collaborations aimed at environmental sustainability.

This research framework was applied to analyze the effectiveness of the Bandung-Kawasaki sister city cooperation by examining several key aspects. First, the study will investigate the initiation and implementation of the partnership, focusing on how it was established and the specific environmental programs that were implemented. This includes examining the roles and responsibilities of both cities, the initial agreements.
made, and the various projects launched under the cooperation framework. Next, the evaluation of goals and outcomes will be conducted to assess whether the cooperative efforts have met the predefined environmental objectives. This involves analyzing data on environmental indicators program performance metrics and comparing the expected outcomes with the actual results achieved through the cooperation.

Operational efficiency will also be evaluated by examining the use of resources, human capital, and adherence to timelines. This includes assessing how efficiently the programs utilized available resources, the effectiveness of human resource deployment, and the extent to which project timelines were met. Efficiency in these areas is critical to understanding the overall performance of the sister-city cooperation.

Lastly, the sustainability and impact of the cooperation will be analyzed to understand the long-term viability and broader effects of the initiatives on environmental management. This involves studying the lasting benefits of the programs, their contributions to sustainable development, and any ongoing or future projects that have stemmed from the initial cooperation. By applying these frameworks, the study aims to provide a comprehensive analysis of the effectiveness of the Bandung-Kawasaki sister city cooperation. The findings will offer valuable insights into the successes, challenges, and best practices of the partnership, which can inform and guide future international collaborations aimed at achieving environmental sustainability.

1. Punctuality: the program that has been formulated must be implemented properly in accordance with the time that has been determined. This is so that these programs produce output as expected and provide satisfaction to program recipients.

2. The human resources who manage the program are the determining factor in the success of the program. In this case, the selection of human resources to implement the program needs to be done. The selection of human resources is based on criteria that are in accordance with the program implemented. This emphasizes the principle of "the right man on the right job."

3. The working mechanism, or the ways taken to implement the program, is a rule and strategy that has been determined to implement the program. If employees apply a good work mechanism, the objectives of a program will be achieved well.

4. Cooperation and communication need to be carried out in the implementation of the program. In this context, cooperation and communication are established between program organizers and program organizers regarding program targets.

5. The correct distribution of funds is a working mechanism that involves program financing. Available funds are used effectively and efficiently.

6. There are no deviations, which emphasizes the absence of deviations in determining program targets.
3. Research Method

The research methodology employed in this study was qualitative, focusing on the use of secondary data. Qualitative research involves the collection and analysis of non-numerical data to understand concepts, opinions, or experiences. It emphasizes the exploration of phenomena through detailed descriptions, contextual analysis, and interpretation of data sources rather than through statistical analysis (Creswell & Poth, 2018). This approach was particularly suitable for understanding the dynamics and effectiveness of the Bandung-Kawasaki sister city cooperation in environmental management.

Secondary data refers to information that has been previously collected and published by other researchers, organizations, or institutions. In this study, the secondary data included credible journal articles, books, online news articles, and official documents from government websites. This type of data is advantageous as it provides a broad and rich context for analysis, allowing researchers to draw on existing knowledge and insights (Johnston, 2017). The objective of this research was to determine the effectiveness of the environmental cooperation between Bandung and Kawasaki. To achieve this, the study employed a comprehensive data collection technique that involved identifying, gathering, and reviewing relevant literature. The process began with a thorough literature review to collect data sources that align with the research topic. Once collected, the data were examined for its relevance, credibility, and contribution to the research questions.

After data collection, the analysis phase involved organizing and interpreting the data using descriptive analysis techniques. Descriptive analysis helped summarize and present the data in a way that highlights key patterns and insights. This approach ensures that the findings are clearly articulated and accessible to both the researchers and the readers (Braun & Clarke, 2019). Numerical analysis techniques were also utilized, where applicable, to support the qualitative findings with quantifiable evidence, such as trends depicted in diagrams or tables.

The qualitative methodology, supported by robust secondary data, allowed for an in-depth exploration of the subject matter, providing a comprehensive understanding of the effectiveness of the sister-city cooperation. The integration of multiple data sources enhanced the validity and reliability of the research findings, offering a well-rounded perspective on the impact and outcomes of the Bandung-Kawasaki partnership in environmental sustainability.

4. Result

4.1. Kawasaki City and Bandung City Cooperation Program in the Environmental Sector

Environmental issues, primarily driven by human activities, pose significant threats to the ecosystems and the quality of life for humans, animals, and plants. These issues, which include deforestation, pollution, and waste mismanagement, contribute to broader problems such as the climate crisis, which manifests through increased global temperatures and erratic weather patterns adversely affecting agriculture, plantations, and fisheries (Achmad, 2011). Addressing these challenges requires robust cooperation across various levels, from individuals to international entities.
In the contemporary era of globalization, international cooperation extends beyond nation-states to include collaborations between cities from different countries. Such partnerships are particularly effective when the involved cities share common interests, goals, or challenges (Limbong, 2021). In Indonesia, numerous cities engage in international collaborations to tackle local and global issues. Notably, the cities of Bandung and Kawasaki have established a partnership focused on addressing environmental problems.

The cooperation between Bandung and Kawasaki has been formally recognized and developed over several years. This relationship was formally initiated in 2015 and operationalized in 2016 with the signing of a Memorandum of Understanding (MoU) in Kawasaki (Kerjasama.bandung.go.id, 2023). The collaboration was first conceived during the 2013 United Nations Environment Program and the International Environmental Technology Centre (UNEP-IETC) Eco-town project, where Kawasaki identified similar environmental challenges faced by Bandung, drawing parallels to its own historical environmental issues dating back to 1967 (Siregar, 2013). The environmental cooperation program between Bandung and Kawasaki includes several key initiatives:

1. **Air Quality Management**: Efforts to monitor and improve air quality through advanced technologies and practices.
2. **Solid Waste Management**: Implementation of effective waste segregation, recycling, and disposal methods.
3. **Wastewater Management**: Development and application of efficient wastewater treatment and management systems.
4. **Energy Management**: Promotion of sustainable energy practices and technologies to reduce environmental footprints.
5. **Transportation Technology**: Introduction and enhancement of eco-friendly transportation options.
6. **Other Environmental Programs**: Various initiatives aimed at fostering a sustainable urban environment.

Through this collaboration, Bandung benefits significantly in several ways, such as enhancing the quality of its human resources, acquiring advanced technologies, and progressing towards becoming an environmentally friendly city. The partnership facilitates technology transfer and capacity building, which are crucial for developing sustainable urban practices (Rabbani & Hayat, 2022).

4.2. Implementation of the Bandung City and Kawasaki City Cooperation program in the field of Environment

The Bandung-Kawasaki environmental cooperation encompasses five main programs: Solid Waste Management, Wastewater Management, Air Quality Management, Energy Management, and Transportation Technology. Over the past five years, the
implementation of these programs has focused on managing these sectors and addressing associated challenges. A collaborative team comprising experts from both cities, private institutions, researchers, and academics has been established to tackle issues such as solid waste management and the development of biodigesters for processing organic waste into biogas (Siregar, 2013). The cooperation involves a series of activities, including socialization, training, and education for the community, as well as direct visits to Kawasaki. An environmental management competition between neighborhood associations (RWs) was also introduced, covering waste management, biopori (water infiltration pits), and reforestation activities. These initiatives aim to motivate and educate the community about environmental stewardship (Annisa, 2012).

One of the notable programs promoted by the Bandung government is "Kang Pisman" (an acronym for Reduce, Separate, and Utilize), which emphasizes proper waste management practices (Fauziya, 2018). Additionally, the "Citarum Harum" program was launched to control pollution and rehabilitate the Citarum River. The Bandung city government organized River Water Quality Management Training in Kawasaki in 2019 and participated in the 4th Joint Training Program on Waste Management and Water Quality Management in 2020. These training sessions aimed to enhance local capacity in managing water resources effectively (RIDHOSAR, 2021). The Kawasaki government has played a crucial role by providing assistance through discussions, knowledge sharing, and evaluations. This partnership has yielded several notable outcomes in solid waste management:


2. Education for Commercial Companies: The collaboration has extended to educating businesses on proper waste management from upstream to downstream processes. This initiative helps mitigate the environmental impact of commercial operations and promotes sustainable practices.

3. Application of the 3R Principle: The implementation of the 3R (Reduce, Reuse, Recycle) principle at landfills and transfer stations (TPS) has improved waste management standards in Bandung. This collaboration has enhanced the city's capability to manage waste effectively, adhering to best practices in environmental management.

4. Long-term Planning and Sustainability: The cooperation has emphasized the importance of long-term planning and the institutionalization of waste management practices. This approach ensures that programs are not only implemented for a limited period but become ingrained in the city's operational framework, fostering sustainable environmental management (Siregar & Rizquullah, 2022).
Thus, the Bandung-Kawasaki cooperation has significantly contributed to improving Bandung's environmental management capabilities. By integrating community engagement, education, and the application of best practices, the partnership has successfully addressed various environmental challenges and promoted sustainable urban development.

4.3. Analysis of Bandung and Kawasaki City Sistercity Cooperation Program in the Environmental Sector in the Theory of Effectiveness

The success of any planned program is a key objective for planners and implementers alike. The environmental cooperation program between Bandung and Kawasaki, executed through transregional paradiplomacy, exemplifies such an initiative. This program involves a series of strategies and collaborative efforts aimed at achieving specific environmental goals. The theory of effectiveness, as defined by experts, suggests that a program's effectiveness can be evaluated based on whether it meets its desired targets and objectives. According to Campbell, the effectiveness of a program can be assessed through several dimensions, including program success, goal achievement, satisfaction with the program, input and output levels, and overall goal attainment. This section analyzes the Bandung-Kawasaki sister city cooperation program in the environmental sector using these criteria.

An outstanding illustration of how sister-city relationships may have a big positive impact is the environmental cooperation initiative between Bandung and Kawasaki. We can use Campbell’s criteria to gauge this initiative’s efficacy. First off, observable improvements in environmental quality, such as lower pollution levels and better waste management systems, are indicators of the program's success. The accomplishment of particular objectives established by both cities, such as the deployment of collaborative green technology initiatives and the sharing of best practices in environmental management, is indicative of goal achievement. Feedback from stakeholders, such as local governments, companies, and community organizations, who have noted successful results from the partnership can be used to determine how satisfied they are with the program. The evaluation of input and output levels can be achieved through an analysis of the resources allocated by the two cities and the consequent advantages, which include enhanced capability for environmental programs and fortified institutional structures. The long-term durability and resilience of the environmental policies and practices created through the collaboration serve as a final indicator of overall aim attainment. Applying these aspects reveals that the collaboration program between Bandung and Kawasaki has made significant strides toward achieving its environmental goals, showcasing the ability of transregional paradiplomacy to address global issues through local action.

Program Success

The Bandung-Kawasaki cooperation includes five primary environmental programs: solid waste management, wastewater management, air quality management, energy management, and transportation technology. Over the past five years, solid waste management has been the most successfully implemented program. This success is evidenced by various initiatives, such as the Kang Pisman program (Reduce, Separate, Utilize), environmental management competitions between RWs (neighborhood...
associations), and the inclusion of environmental education (PLH) in local curricula (Sysadmin, 2016). While the other four programs have been initiated, their implementation has not been as comprehensive or impactful.

**Goal Achievement**

The overarching goals of the sister city cooperation are to build environmentally friendly cities and enhance the quality of human resources in both Bandung and Kawasaki. Significant achievements have been made in these areas, particularly in community-driven initiatives such as independent sorting of organic and inorganic waste. These actions align with the program's objectives of fostering sustainable practices and improving environmental management at the local level.

**Satisfaction with the Program**

Community feedback indicates a positive reception of solid waste management initiatives. According to the regional secretary of Bandung City, there are multiple regions where waste management practices have been effectively adopted. This shift in community behavior and mindset towards environmental stewardship suggests that the programs have successfully motivated voluntary participation rather than compulsion (Humas Kota Bandung, 2022).

**Input and Output Levels**

Data and literature review reveal that substantial inputs have been dedicated to the solid waste management program, including community engagement, educational campaigns, and infrastructural support. The outputs from these inputs include increased waste segregation practices among residents, waste management education in commercial settings, the application of the 3R principles (Reduce, Reuse, Recycle), and ongoing evaluations and improvement planning. These outputs demonstrate tangible progress in waste management practices, albeit with varying levels of success across different programs.

**Overall Goal Achievement**

While the solid waste management program shows significant progress, other programs within the cooperation have not achieved the same level of implementation and impact. The breadth of the five environmental programs necessitates considerable time, effort, and financial resources to fully realize their potential. Despite these challenges, the benefits of the implemented programs have been evident within the community, highlighting the partial but meaningful success of the cooperation.

Based on above, it can be seen that the Bandung-Kawasaki sister city cooperation program in the environmental sector exhibits varying degrees of effectiveness across its initiatives. Solid waste management stands out as the most successful program, achieving substantial community engagement and positive environmental outcomes. However, the overall effectiveness of the cooperation is tempered by the less comprehensive implementation of other programs. Moving forward, sustained efforts and additional resources will be essential to enhance the effectiveness of the remaining programs and to
achieve the broader goals of environmental sustainability and improved quality of human resources.

5. Discussion

The environmental programs resulting from the Bandung-Kawasaki sister city cooperation have yielded numerous benefits, highlighting the positive impact of this international partnership. Despite these achievements, the full realization of all programs remains in progress, requiring sustained effort and resources. The need for ongoing allocation of time, funds, and energy is evident, as the cooperation has been extended for an additional three years to continue these initiatives (Humas Kota Bandung, 2023). This extension underscores the commitment of both cities to address remaining challenges and optimize the effectiveness of their collaborative efforts.

An analysis using the theory of effectiveness shows that the Bandung-Kawasaki sister city program has been quite effective in delivering useful outputs that benefit the community. However, there are notable shortcomings that must be addressed. The strategies and supporting tools used in the program need refinement to achieve comprehensive success. The effectiveness theory posits that a program’s success can be evaluated through various metrics such as goal achievement, satisfaction, and the balance of inputs and outputs. While the program has met several objectives and garnered community support, it must overcome specific limitations to fully realize its potential.

The importance of sustainable improvement and adaptation is emphasized in the ongoing cooperation between Bandung and Kawasaki. To maximize the benefits of the partnership, both cities should focus on enhancing their methods through current initiatives. For instance, increasing public involvement and enhancing transparency in program implementation can foster greater public support and participation. Effective public engagement can lead to a more robust community buy-in, which is crucial for the long-term success of environmental initiatives (DLH Bandung, 2020).

Additionally, leveraging technology can significantly improve communication between the cities and streamline procedural efficiencies. The use of advanced technological solutions can facilitate better coordination, data sharing, and real-time monitoring, which are essential for managing complex environmental projects. By addressing these areas, the sister city programs can evolve to meet the needs of both communities better, resulting in a stronger and more sustainable partnership. Moreover, focusing on continuous evaluation and feedback mechanisms can help identify areas needing improvement and adapt strategies accordingly. This iterative process ensures that the programs remain relevant and effective over time, adapting to new challenges and opportunities as they arise.

In conclusion, while the Bandung-Kawasaki sister city cooperation has made significant strides in addressing environmental issues, ongoing efforts are needed to enhance its effectiveness. By improving strategies, increasing public engagement, leveraging technology, and ensuring sustainable practices, the partnership can achieve its full potential, benefiting both cities and serving as a model for other international collaborations.
6. Conclusion

Forming cooperative relationships is a crucial strategy in addressing environmental issues. Paradiplomacy, which involves partnerships between domestic city governments and their counterparts in other countries, exemplifies this approach. The sister city cooperation between Bandung and Kawasaki is a prominent example aimed at fostering environmentally friendly urban development. The programs planned under this cooperation encompass a broad spectrum of environmental issues, demonstrating a comprehensive approach to sustainable city management.

The implementation of these programs, although not yet exhaustive, has been substantial. Key initiatives in solid waste management, wastewater management, air quality management, energy management, and transportation technology have been rolled out with varying degrees of success. The effectiveness of the sister city program can be considered satisfactory, given that several implemented programs have yielded tangible benefits for the community. These initiatives have been well-received, with many being adopted and executed independently by the local population.

Overall, the Bandung-Kawasaki sister city cooperation has proven to be an effective model of international collaboration in the environmental sector. The progress made thus far underscores the potential for further advancements. Continuous improvement, increased public engagement, and leveraging technological advancements will be critical in enhancing the impact and sustainability of these programs, ensuring long-term environmental benefits for both cities.

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