



An Analysis of the Effectiveness of the Bandung-Kawasaki Gesuido (BKG) project within a Sister City Partnership Framework

Alessandro Kurniawan Ulung^{1*}, Pradono Budi Saputro², Yuli Setiawan³

^{1,2}Department of International Relations, Universitas Satya Negara Indonesia, Jakarta, Indonesia

³Management, Universitas Satya Negara Indonesia, Jakarta, Indonesia

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ABSTRACT

This study examines the effectiveness of the Bandung–Kawasaki Gesuido (BKG) Project within the sister city partnership between the governments of Bandung and Kawasaki. The project aims to facilitate collaboration between the two cities in addressing wastewater management challenges in Bandung. Accordingly, this study poses the following research question: How effective is the BKG Project in implementing the Bandung–Kawasaki sister city partnership? This study applies Kevin O’Toole’s theoretical framework on the phases of sister city partnerships and adopts a mixed-methods approach. Data were collected and analyzed through interviews, questionnaires, observations, and a literature review. Questionnaires were distributed to nearly 200 respondents, including teachers, students, and staff of the Bandung administration. The findings show that the Bandung–Kawasaki partnership is currently in the reciprocative phase, with the BKG Project as its main initiative. At this stage, the BKG Project has been effective in facilitating knowledge transfer from Kawasaki to Bandung. This process enables the Kawasaki government to support capacity development among staff of the Bandung administration, as well as teachers and elementary school students, in improving wastewater management practices in Bandung. The novelty of this research lies in its focus on assessing the BKG Project, making it the first study to do so. This study contributes to the growing body of literature on sister city partnerships in Indonesia and offers insights into ongoing debates about their practical impact and value.

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1. INTRODUCTION

A sister city partnership is a long-term cooperation between two cities from different countries to strengthen cultural, educational, economic, and occasionally political ties (Sabati, 2024; Ulung et al., 2025). In the context of cultural exchange, this partnership enhances mutual understanding between the people of the two cities through activities such as student exchanges, tourism programs, and joint art festivals. In education, it facilitates academic collaboration through school partnerships, language programs, and joint university initiatives. This partnership also generates economic benefits by stimulating trade, enhancing business connections, and attracting cross-border investments. The establishment of a partnership between two cities from different countries represents a form of paradiplomacy. According to Cornago (2018), paradiplomacy refers to the involvement of subnational governments, such as local, regional, and provincial authorities, in international relations through formal or informal, bilateral or multilateral partnerships with foreign public or private entities. To analyze its effectiveness, O’Toole (2000, 2001) identifies three phases: associative, reciprocative, and commercial. In the associative phase, the partnership is effective in cultivating international friendship and increasing global awareness. Reciprocative phase extends beyond symbolic friendship to skill-based exchange. In the reciprocative phase, the partnership is effective in deepening international understanding through capacity development. In the commercial phase, the partnership demonstrates effectiveness in producing tangible economic outcomes.

Sister city partnerships have developed in Indonesia. Bandung in West Java and Kawasaki in Japan have established a sister city partnership since 2015. This inter-city cooperation aims to transform Bandung into a sustainable city in the province. This partnership enables the Kawasaki government to assist its counterpart in Bandung in addressing environmental issues in the city. The two governments officially launched this partnership through the signing of Letter of Intent in 2015 (Hakiem et al., 2025; Siregar & Rizqullah, 2022). The two cities implement this sister city partnership through the Bandung-Kawasaki Gesuido (BKG) Project. This project facilitates Bandung and Kawasaki to work together to support the Sustainable Development Goals in Bandung, West Java. This project provides a platform for both city governments to address Bandung’s major environmental challenges, especially its serious waste and wastewater problems. In this cooperation, Bandung relies on Kawasaki

* Corresponding Author: Alessandro Kurniawan Ulung: a.kurniawan.ulung@usni.ac.id

for knowledge and experience because Kawasaki has successfully overcome similar environmental issues in the past. The BKG Project is designed to strengthen the capacity of Bandung's government officials and local communities to improve wastewater quality, with the expectation that these good practices will gradually spread across the city.

The BKG Project was launched in 2023. This project operates after Bandung and Kawasaki renewed the partnership and then signed a Memorandum of Understanding (MoU) in 2020. Under this agreement, both cities have commitment to cooperation in three key areas: waste management, water environment management, and air quality management (Aurelivia, 2025; Sabati, 2024). The BKG Project puts these commitments into practice by enabling Kawasaki to support Bandung in building its capacity in these sectors. In this sense, the BKG Project represents a concrete implementation of the sister city partnership.

Despite their rising popularity, sister city partnerships have been widely debated by scholars. A key question is whether these partnerships can produce real social, economic, and environmental benefits, or whether they remain largely symbolic. Critics argue that many sister city initiatives focus more on ceremonies than on meaningful action. Several studies support this view. For example, Aisyah & Deniar (2025) found that the partnership between Yogyakarta and Gangwon-do in South Korea was poorly implemented and failed to address its original goals. Garello (2024) reported similar problems in Cauayan City in the Philippines, where partnerships lacked clear objectives and effective monitoring. In Indonesia, sister city cooperation in Palembang with Yangzhou (China) and Houston (United States) has also been criticized as largely symbolic, with limited practical outcomes. According to Kencana et al. (2024), these failures were caused by weak technical capacity, poor coordination, and structural constraints. More broadly, sister city partnerships are also criticized for creating unequal relationships. In many cases, one city provides expertise while the other remains dependent. In South Africa, for example, European cities often dominated project design and technical decisions, while local governments lacked the capacity to continue projects independently. This imbalance reinforced long-term dependency (De Villiers et al., 2007). In addition, the benefits of sister city partnerships are often uneven: wealthier cities can use these networks for economic gain, while cities with fewer resources struggle to make the cooperation meaningful (Safitri et al., 2023; Salsabila, 2025).

However, other scholars highlight the positive impacts of sister city partnerships. These partnerships promote mutual understanding, cultural exchange, and people-to-people diplomacy in ways that national governments often cannot. They are also seen as a form of diplomatic soft power. Importantly, sister city cooperation enables knowledge sharing and policy transfer through technical collaboration and joint projects. For instance, cooperation between Penang (Malaysia) and Yokohama (Japan) led to improvements in road maintenance, recycling programs, and waste data collection (Tjandradewi et al., 2006). Similarly, the partnership between Villa El Salvador (Peru) and Amstelveen (Netherlands) improved environmental management and financial administration in Villa El Salvador (Bontenbal & Lindert, 2008). In Indonesia, cooperation between Yogyakarta and Kyoto supported heritage preservation and strengthened cultural ties (Gunawan, 2024). Beyond environmental and cultural benefits, sister city partnerships can also support economic development by encouraging trade, tourism, and investment through stronger trust and lower transaction costs. They also promote community participation by involving NGOs, schools, and citizen groups, thereby strengthening grassroots cooperation and global awareness (Atanga et al., 2024; Intenilia & Putra, 2021; Kipkemoi et al., 2025).

Against this background, this study aims to contribute to the debate on the effectiveness of sister city partnerships by examining the Bandung–Kawasaki partnership, with a specific focus on the BKG Project. The study analyses how the project has been implemented and evaluates its effectiveness in supporting Bandung's sustainable development goals. Accordingly, the research asks: *How effective is the BKG Project in implementing the Bandung–Kawasaki sister city partnership?* The study explores both the implementation process and the extent to which the project achieves its stated objectives.

Employing O'Toole's theory, the findings show that the BKG Project has been effective in generating reciprocal benefits. This study finds this project effective in facilitating capacity development among staff of the Bandung administration, as well as teachers and elementary school students, in improving wastewater management practices. The Kawasaki government transfers knowledge to the staff of Bandung administration, teachers, and elementary school students to enhance their awareness and develop their skills in waste management. The implementation of the BKG project focuses more on changing everyday waste disposal practices among other things. By prioritizing knowledge and behavioral change, the project seeks to address the cultural roots of wastewater pollution. In this way, the BKG Project draws on Kawasaki's strong waste management culture to promote more sustainable practices in Bandung. This study contributes to the literature by providing the first in-depth analysis of the BKG Project, offering new insights into the practical effectiveness of the Bandung–Kawasaki sister city partnership.

2. METHOD

This study employs a mixed-methods approach, combining qualitative and quantitative techniques to examine the effectiveness of the BKG project within the Bandung–Kawasaki sister city partnership. In this approach, qualitative and quantitative findings were collected, analyzed, and interpreted (Hennink et al., 2020; Miles & Huberman, 1994). Quantitative data were obtained through questionnaires distributed to respondents, while qualitative data were gathered from a literature review and interviews. Secondary data were collected by reviewing a wide range of sources, including books, scholarly articles, reports, and news publications. In addition, primary data were obtained through interviews and observations conducted in Bandung in July and August 2025. All primary and secondary data were then triangulated to ensure validity in the analysis process. The interviews were conducted with the following informants:

- a. Yuliandri Rahadiyanto, M.Si., Head of Research and Development, Bandung Development Planning and Research Agency (July 10, 2025).
- b. Christine Mugia Restu, S.IP., Head of Foreign Cooperation Team, Cooperation Division, Bandung Administration (July 11, 2025).
- c. Ira Ekawati, S.S., from Cooperation Division, Bandung Administration (July 11, 2025).
- d. Asep Nandar, S.Pd., a teacher from SDN 079 Kopo Pajagalan, Bandung (July 11, 2025)
- e. Fizarita, M.T., Head of the Environmental Pollution Rehabilitation and Prevention Division, Bandung Environment Agency (August 15, 2025).
- f. Dr. Anni Rochaeni, Environmental Engineering lecturer, Pasundan University (August 15, 2025).
- g. Yamauchi Takehisa, Deputy Manager, International Projects Promotion Unit, Waterworks and Sewerage Bureau, City of Kawasaki (August 18, 2025).

In addition to interviews, this study directly observed the implementation of the BKG project, especially the training sessions organized by the governments of Bandung and Kawasaki for civil servants and teachers in Bandung. The study also distributed questionnaires to nearly 200 respondents, consisting of civil servants, teachers, and parents. In total, 100 parents, 18 teachers, and 81 civil servants completed the questionnaires. The respondents were selected using purposive sampling, meaning only individuals who were directly involved in the BKG project were chosen. This method was used to ensure that the data collected was relevant and meaningful. The selected civil servants were those working for the Bandung municipal government who were directly involved in planning and implementing the BKG project. They came from the Cooperation Division, the Environment Agency, the Water Resources Agency, the Public Housing and Settlement Areas Agency, and the city-owned water company, Tirtawening. The selected teachers were from SDN 079 Kopo Pajagalan, Bandung, which was chosen as the location for the BKG training sessions. These teachers were included because they observed and monitored changes in students' behavior after the training activities. The selected parents were those whose children participated in the BKG training sessions at SDN 079 Kopo Pajagalan. They were included because they could observe changes in their children's behavior at home. The questionnaires given to civil servants, teachers, and parents were designed to evaluate the effectiveness of the BKG project based on their experiences and observations during the training sessions. The quantitative data obtained from the questionnaires were analyzed using a five-point Likert scale, with responses translated into numerical values and percentages to facilitate interpretation. Meanwhile, the qualitative data from interviews and the literature review were examined through thematic analysis. This method aims to identify and interpret patterns within the data. This process included several stages, such as familiarizing with the data, coding, recognizing patterns, and interpreting the resulting themes in line with the research questions.

3. RESULT AND DISCUSSION

O'Toole (2000) explains that sister city partnerships develop through three stages: associative, reciprocal, and commercial. This study finds that the Bandung–Kawasaki partnership is currently in the reciprocal stage. This is evident from the implementation of the Bandung–Kawasaki Gesuido (BKG) Project, which focuses on improving wastewater management in Bandung. Through the BKG Project, Kawasaki transfers knowledge and expertise to Bandung by providing training for local officials. This exchange of knowledge reflects the key characteristics of the reciprocal stage described by O'Toole. The project has also increased public awareness of sustainable wastewater management and is expected to promote better waste disposal behavior. By learning from Kawasaki, Bandung aims to adopt a stronger culture of responsible waste management. The Bandung government also uses the BKG Project to support the achievement of the Sustainable Development

Goals, which serve as a shared international framework guiding the Bandung–Kawasaki sister city partnership. This result will be explained and discussed below.

3.1. Result

3.1.1. The Concept of Sister City

A sister city describes a long-term partnership between two cities from different countries, designed to strengthen cultural, educational, economic, and occasionally political ties (Sabati, 2024; Siregar & Rizqullah, 2022; Ulung et al., 2025). In the context of cultural exchange, this partnership fosters mutual understanding through activities such as student exchanges, tourism programs, and joint art festivals. In education, it encourages academic collaboration via school partnerships, language programs, and joint university initiatives. Economically, sister city arrangements stimulate trade, enhance business connections, and attract cross-border investments. Furthermore, these relationships promote cooperation in governance and technical fields by enabling the sharing of effective practices in areas like infrastructure development, healthcare delivery, and environmental management (Bilder, 1989; Cremer et al., 2001).

Zelinsky, p. (1991, p. 1) explained that cities do not select foreign cities as “sister cities” at random. Instead, their choices are guided by a range of considerations, including historical ties, shared economic and cultural interests, recreational affinities, ideological alignment, similarities or identical place names, and to some extent, geographical proximity. Each of these factors plays a meaningful role in the selection process. For Ramasamy & Cremer, p. (1998, p. 449), the establishment of sister city partnerships is grounded in the shared understanding that cities are meant to have a role as “meeting points between diverse people and cultures.” Such partnerships enable cities to rediscover this original role. After rediscovering this role, they use the sister city partnership to create “marketplaces” for economic and business activities. This suggests that the initial stage of sister city cooperation is primarily driven by ideals of international friendship and cultural exchange, with economic and commercial goals typically following later.

Kevin O’Toole calls the stage of building cultural understanding as the associative phase. He identifies three phases in sister city partnerships: the associative, reciprocative, and commercial phases. In the associative phase, sister city initiatives pursue objectives grounded in international friendship, cultural exchange, and global awareness. In the reciprocative phase, cities formulate educational exchange programs. These programs engage not only school and university students but also professionals, including government officials, to broaden their skills. In the commercial phase, cities increasingly emphasize commerce and economic development. Pressured to act as agents of economic growth, local governments reorient sister city partnerships toward commercial objectives (Cremer et al., 2001; O’Toole, 2000, 2001). Increasingly, scholars argue that commerce and culture in sister city partnerships are mutually reinforcing: cultural understanding facilitates trade and investment, while business engagement provides cultural exchange with a stable and enduring foundation (Ramasamy & Cremer, 1998, p. 450).

There is some overlap between the associative and reciprocative phases because both aim to broaden international understanding and awareness. However, O’Toole, p. (2001, p. 405) emphasizes that associative relationships are more symbolic in nature because it focuses on exchanges such as cultural connections, while reciprocative relationships involve activities that help participants develop practical skills. In the commercial phase, local governments take on the role of economic developers. This phase does not replace the earlier associative and reciprocative stages. Rather, it builds on them. This commercial phase represents an effort to leverage the partnership to support local economic goals while maintaining the existing forms of cooperation (O’Toole, 2001, p. 405).

3.1.2. The Implementation of BKG Project in Sister City Partnership

Bandung and Kawasaki formed a sister city partnership to address environmental issues in Bandung. This partnership allowed Bandung to benefit from transfer of knowledge and technology from its counterpart in Kawasaki, aimed at addressing these challenges and transforming Bandung into a low-carbon, sustainable city. Bandung and Kawasaki established a sister city partnership in 2016 through the signing of a Memorandum of Understanding (MoU). The agreement aimed to promote the transfer of environmental technologies, human resource development, information exchange, and cooperation in five areas: solid waste management, wastewater management, air quality management, energy management, and transportation technologies. The partnership was further strengthened in 2020 with the signing of a second MoU, which focused on collaboration in waste management, water environment management, and air quality management (Aurelivia, 2025; Sabati, 2024; Siregar & Rizqullah, 2022). To implement these initiatives, the two cities established a Joint Working Group consisting of government officials from both sides. Kawasaki was represented by the Waterworks and Sewerage Bureau, among others. Bandung, in turn, was represented by five institutions: the Cooperation Division, the Environment Agency, the Water Resources Agency, the Public Housing and Settlement Areas Agency, and the city-owned water company Tirtawening (Ulung et al., 2025).

By focusing on cooperation in waste management, water environment management, and air quality management, the Bandung-Kawasaki sister city partnership aims to support Bandung's transformation into a low-carbon and sustainable city. Under this partnership, Bandung seeks the transfer of technology and knowledge from Kawasaki to address its wastewater challenges. These persistent challenges in Bandung contribute to greenhouse gas emissions and, consequently, to global warming. The contribution of Bandung's wastewater to greenhouse gas emissions has been studied by several researchers. Novia (2021) found that wastewater processed at IPAL Bojongsoang produced approximately 279.46 tons of CO₂e per day. At the city level, total emissions from activities in Bandung reached 1,681.53 Gg CO₂e in 2022, with the waste sector contributing 10.44 percent of the total emissions (Bappelitbang Bandung, 2023).

In Bandung, greenhouse gas emissions from the waste sector showed a gradual upward trend over the years, rising from 295.6 Gg CO₂e in 2018, 311.9 Gg CO₂e in 2021, to 317.1 Gg CO₂e in 2024. When Bandung and Kawasaki signed their Letter of Intent in 2015, emissions from the waste sector had already reached 327 Gg CO₂e, up slightly from 325.7 Gg CO₂e in 2014 and 315.7 Gg CO₂e in 2010. This upward trend was largely driven by higher emissions of methane (CH₄) and nitrous oxide (N₂O) (Bappelitbang Bandung, 2023; Shabirah et al., 2025). The contribution of the waste sector to overall emissions prompted the Bandung city government to take immediate action to address wastewater problems and work toward becoming a low-carbon city.

Under the Bandung-Kawasaki sister city partnership, the governments of Bandung and Kawasaki launched the Bandung-Kawasaki Gesuido (BKG) project in May 2023 to address Bandung's wastewater challenges and help transform the city into a sustainable urban area (Burhanudin, 2023). Through the BKG project, the two city governments aim to equip staff from the Bandung administration with training sessions to give the knowledge and skills needed to improve wastewater quality. Once the training sessions are completed, these trained staff members will be tasked with conducting outreach and training sessions for local communities and residents. These community sessions are intended to increase public understanding of water and environmental concerns and empower residents to take action in addressing them (Ulung et al., 2025).

The training sessions are intended to facilitate the transfer of knowledge and institutional experience in addressing wastewater challenges previously encountered in Kawasaki, according to Toshiyuki Suzuki, Executive Director of the Kawasaki Waterworks and Sewerage Bureau. He highlighted that, similar to the problems currently faced by Bandung, Kawasaki experienced severe wastewater issues during the 1960s. In response, the Kawasaki municipal government not only reinforced regulatory frameworks governing wastewater management but also established urban wastewater treatment plants (IPAL) that were systematically integrated with wastewater sources (Burhanudin, 2023). Through strict law enforcement and sustained public engagement, Kawasaki successfully restored the heavily polluted Tamagawa River, a model they expect the Citarum River in Bandung to emulate through the BKG project. Kawasaki's experience highlights the central role of public participation, showing that shifting cultural attitudes toward wastewater management is essential. For this reason, the training sessions are designed as a platform to educate Bandung's communities and encourage behavioral change. Drawing from its own long-term public engagement efforts, the Kawasaki government now uses the BKG project to conduct training for Bandung's civil servants, as well as elementary school students and teachers in the city (Takehisa, interview, August 18, 2025).

Training sessions for Bandung's Civil Servants

As part of the BKG Project, Bandung and Kawasaki organize seminars and workshops for civil servants in both cities. Bandung officials visit Kawasaki to directly observe sustainable practices, such as how wastewater treatment plants (IPAL) operate and why they have been effective in addressing wastewater problems. In return, Kawasaki sends its civil servants to Bandung to provide practical, hands-on training. Through this exchange, the Kawasaki government expects Bandung's civil servants to improve their skills in managing wastewater issues and to share this knowledge with the wider community, especially small and medium enterprises (SMEs). SMEs are an important target of the project because they are major contributors to wastewater pollution. For example, tofu producers and laundry businesses often discharge untreated wastewater into rivers, which has caused serious water pollution in Bandung (Fiziarita, interview, 15 August 2025).

Since 2023, the two cities have held at least twelve training sessions, including three in Kawasaki and nine in Bandung. The first training in Kawasaki took place from 22 to 27 July 2023. During this program, Bandung officials learned about Kawasaki's wastewater treatment system and its approach to improving water quality through collaboration with various stakeholders, including local communities. The training also included visits to wastewater treatment facilities. Before this program, Kawasaki officials visited Bandung in June 2023 to assess two pilot locations of the BKG Project: Nyengseret Sub-district in Astanaan District and Pasirluyu Sub-district in Regol District. In Nyengseret, they reviewed wastewater pipelines, treatment facilities, and the condition of the Citepus River. In Pasirluyu, they focused on the Cikapundung River and nearby treatment facilities. Both rivers are tributaries of the heavily polluted Citarum River.

The serious pollution of the Citarum River led the central government to launch the Citarum Harum Program in 2018, which aims to restore the river through better waste management, stronger community involvement, and improved wastewater treatment. In line with this national program, the Bandung government uses the BKG Project to address wastewater problems in the Citarum's tributaries. Within this framework, the Kawasaki government has supported capacity-building activities for Bandung officials from four agencies: the Environment Agency, the Water Resources Agency, the Public Housing and Settlement Areas Agency, and the municipal water company, Tirtawening. One example is a Kawasaki-led training session held at Tirtawening in Bandung on 20 August 2025.



Figure 1. Kawasaki staff train Tirtawening staff during a BKG workshop, August 2025

The training session enabled the Kawasaki government to transfer knowledge to the staff of Tirtawening. During the program, they learned about the role of the water cycle and the current conditions of wastewater management in Bandung, both offsite and onsite. Each approach poses challenges for Tirtawening, including the widespread use of septic tanks that do not yet meet proper standards. These substandard septic tanks are commonly found in many households. The training provided strategies to address these issues. For example, Kawasaki staff trained Tirtawening personnel on the application of Nudge Theory, a behavioral approach employed by the Kawasaki government to overcome wastewater challenges in their city. The Kawasaki government introduced this theory as part of an educational strategy to help Tirtawening engage local communities more effectively.

Nudge Theory, developed by Richard Thaler and Cass Sunstein, explains how people's behavior can be influenced not only by rules and regulations, but also by small and subtle changes in how choices are presented. These changes, called "nudges," guide people toward better decisions without removing options or forcing them to act in a certain way. Instead of strict enforcement, nudges gently encourage positive behavior while allowing individuals to keep their freedom of choice (Otaki et al., 2022, p. 1). In Japan, Nudge Theory has been widely studied and applied. Otaki et al. (2022) showed that visualizing water as a shared public resource encouraged households in Tokyo to reduce water use, especially among low-consuming households. This finding demonstrates that simple behavioral cues can help address urban water problems. Inspired by such results, Japan's Ministry of the Environment established its first nudge unit in 2015. In 2017, the government also created the Behavioral Sciences Team (BEST) to coordinate nudge initiatives nationwide (Murayama et al., 2023, p. 5). BEST promotes voluntary behavior change through approaches that respect personal values and maintain freedom of choice (BEST, 2019, p. 5).

During a BKG Project training session in Bandung, the Kawasaki team shared a practical example of how nudge techniques are used in their city. The Kawasaki government installed colorful and attractive cigarette disposal boxes with simple questions printed on them, such as "What makes you upset?" The boxes had two holes with different answer options, encouraging smokers to "vote" using their cigarette butts. Another box asked, "I hate Monday," with options "Yes" and "No." By using bright colors, humor, and curiosity, these disposal boxes encouraged smokers to throw away cigarette butts properly. Through this training, the BKG Project helps Bandung's administrative staff learn how nudge techniques can be applied in everyday public settings.

Training sessions for Bandung's Elementary School Teachers

Staff from the Bandung administration who joined the BKG Project training are now responsible for training elementary school teachers across the city. The goal is to pass on the knowledge they gained from the Kawasaki government. Kawasaki officials also take part in these sessions to support Bandung staff in delivering

the training. One example took place on 19 November 2024 at SDN 079 Kopo Pajagalan, an elementary school in the Nyengseret sub-district. This school was chosen because it is located next to the Citepus River, a tributary of the heavily polluted Citarum River. After the training, teachers are expected to share what they have learned with their students and with local residents in the surrounding community (Ekawati, interview, 11 July 2025).

In 2025, the Bandung and Kawasaki governments expanded this initiative by involving more teachers. On 26 August 2025, they organized a larger training session at the Grandia Hotel in Bandung, attended by more than 50 teachers from 30 elementary schools. The session explained how poor domestic waste management has disrupted Bandung's water cycle. It highlighted that many residents still dump organic waste into rivers, even though the city already has the Bojongsoang wastewater treatment plant (IPAL) and most households have septic tanks. The training also explained how wastewater is treated. At IPAL, organic waste is processed through physical and biological methods, known as the offsite system. In households, waste is treated in septic tanks, which is called the onsite system. However, many septic tanks are poorly built and leak, while some households deliberately install pipes that discharge waste directly into rivers. As a result, despite the availability of both systems, raising public awareness to stop dumping domestic waste into rivers and drains remains a major challenge in Bandung (Fiziarita, interview, 15 August 2025).

The BKG Project addresses waste problems by training elementary school teachers, who are expected to pass this knowledge on to their students. Teaching children at an early age is important because elementary school students are still developing and can easily learn new habits, especially from their teachers. Teachers play a role similar to second parents, as students spend much of their time at school and interact with teachers every day. During the training, the BKG team introduced teachers to Nudge Theory and showed how it can be applied in schools. This approach encourages students to dispose of waste properly in a natural and non-coercive way. By using simple cues and positive encouragement, teachers can help students develop better habits related to waste disposal (Takehisa, interview, 18 August 2025).



Figure 2. BKG members train elementary school teachers, August 2025

The BKG team also introduced an educational character called Si Jalu, short for *Siap Jaga Lingkungan* (Ready to Protect the Environment). Si Jalu is a green animated sucker-mouth catfish, chosen because this fish naturally helps clean waste in rivers and fish tanks. To reflect local culture, Si Jalu wears an *iket Sunda*, a traditional Sundanese headcloth commonly worn in Bandung. The idea of using an animated character came from the Kawasaki government, which has successfully used similar characters in Japan to educate children. Inspired by this approach, Bandung developed Si Jalu and created an educational video featuring the character. The video presents simple stories about wastewater problems in Bandung and how to address them, making the message easy for children to understand and remember (Takehisa, interview, 18 August 2025).

Training sessions for Elementary School Students

Under the Bandung–Kawasaki Gesuido (BKG) Project, the BKG team works with elementary school students to promote better waste management in the community. The team organizes training sessions that allow representatives from the Kawasaki government to meet directly with residents and students. During these sessions, participants learn how to properly dispose of waste, especially organic waste. To make the lessons easy to understand, the BKG team uses an educational video featuring a character named *Si Jalu*. Through this approach, the team hopes that students can understand wastewater problems and apply simple actions in daily life, such as not throwing organic waste into rivers or drainage channels.

On 11 February 2025, the BKG team held a training session at SDN 079 Kopo Pajagalan Elementary School. The event involved 140 fourth-grade students and their parents and was titled “*Domestic Wastewater Management Seminar for Bandung Residents.*” The seminar aimed to raise awareness about proper organic waste management. This was important because many residents did not realize that everyday activities, such as washing greasy cooking utensils, could pollute rivers. Some residents also continued to pour used cooking oil into sinks, even though sinks are directly connected to drainage systems. Interviews showed that this practice was often caused by a lack of knowledge, especially among street vendors, such as fried snack sellers, who were unsure how to dispose of used cooking oil properly (Nandar, interview, 11 July 2025).

In addition to awareness-raising, the BKG team provided practical training on wastewater management. Participants learned how to measure water pH, check the condition of drainage channels, clean clogged pipes, dispose of household wastewater safely, and filter dirty water so it could be reused. The training was conducted jointly by staff from Tirtawening and the Kawasaki Waterworks and Sewerage Bureau. Before the sessions, both sides worked together to prepare the training materials. This collaboration was necessary because the Kawasaki team needed guidance on local conditions in Bandung, which was provided by Tirtawening as the Bandung government’s representative in the BKG Project (Nandar, interview, 11 July 2025).



Figure 3. Kawasaki staff teach elementary school students, February 2025

Bandung and Kawasaki are working to include the wastewater management lessons from the BKG training sessions into formal environmental education. This is important because current environmental textbooks mostly focus on theory and lack practical activities. By integrating the BKG Project into the curriculum, the two cities aim to give students hands-on knowledge that reflects real environmental problems and solutions in their communities. To support this effort, the Bandung Environment Agency has partnered with the Bandung Education Agency to add BKG-related activities and lessons to environmental education textbooks. Through this approach, the project’s impact goes beyond the training participants and helps build long-term environmental awareness and responsible behaviour among future generations in Bandung (Nandar, interview, 11 July 2025).

The BKG training sessions for residents also reveal differences between Japan and Indonesia in how waste management education is taught. In Japan, children are taught from an early age to care for their environment. Elementary school students clean their classrooms, hallways, and toilets every day. These practices are reinforced at home, where parents encourage children to help with cleaning and waste management, creating strong links between school and family habits. In contrast, in Indonesia, including Bandung, such early environmental training is generally limited. As a result, children are less likely to see waste management as a personal responsibility. Research shows that teaching environmental care during childhood increases the chance that these habits will continue into adulthood (Iwasaki, 2022). Aware of this, the Bandung and Kawasaki governments involve elementary school students in training sessions that were originally designed for adult residents. This approach aims to develop environmentally responsible children who can also influence the behaviour of their families and local communities (Restu, interview, 11 July 2025).

3.1.3. The Effectiveness of the BKG Project

The BKG project facilitates the transfer of knowledge from Kawasaki to Bandung, contributing to improved understanding and awareness of waste management among Bandung city government staff, as well as

elementary school students and teachers. The training sessions conducted under the BKG project have enhanced participants' knowledge and awareness of waste management. To obtain these data, questionnaires were distributed to nearly 200 respondents from diverse backgrounds, including staff of the Bandung administration and elementary school teachers and students. This study employs purposive sampling to ensure that the questionnaires were completed by individuals directly involved in the BKG Project. Each respondent was asked to rate their level of improvement in understanding and behavior on a scale from 1 (no improvement) to 5 (very significant improvement). The findings indicate that administrative staff in Bandung reported a score of 5, reflecting a very significant improvement in both their understanding and behavior related to wastewater management after participating in the project. Meanwhile, teachers and elementary school students also showed notable progress, with a score of 4 in place.

Table 1. Scale of Improvement after the BKG Project

	Mean	Mode	Mean	Mode	Mean	Mode
Improvement in understanding	4.49	5	4	4	3.68	4
Improvement in behavior	4.5	5	4.1	4	3.68	4

Source: Questionnaires

The BKG training sessions have contributed to increasing awareness among civil servants from relevant agencies in Bandung regarding wastewater issues in the city, including the Environment Agency, the Water Resources Agency, the Public Housing and Settlement Areas Agency, and the municipal water company, Tirtawening. Specifically, 57.50 percent of participants reported understanding the issue very well, 38.75 percent indicated that they understood it, and 3.75 percent demonstrated only a basic understanding. The improved comprehension resulting from the BKG project's training sessions is expected to contribute to raising awareness within local communities. The lack of community awareness about the dangers of disposing waste into rivers remains a pressing concern. Civil servants are therefore expected to transfer their knowledge to the public. Wastewater management in Bandung continues to be a multifaceted problem, arising not only from limited community awareness of the risks of discharging waste into rivers and waterways, but also from insufficient understanding of which types of organic waste should not be released directly into these channels. This challenge is further compounded by septic tanks that are frequently constructed without proper standards, leading to leaks that contaminate surrounding water sources.

During the training sessions, the BKG team introduced participants to the proper standards for septic tanks, covering aspects such as design, capacity, maintenance, and distance from water sources. Structurally, for instance, tanks should be built with durable, watertight materials to prevent leakage. A standard septic tank typically consists of at least two chambers, which allow solids to settle and partially decompose before the liquid effluent is discharged. To avoid overflow and clogging, tanks should be desludged every 2 to 5 years, depending on usage. In Bandung, however, many septic tanks are not emptied regularly, and some have never been emptied at all. Moreover, some tanks are not watertight, leading to effluent leakage. The BKG training session helped most participants gain a clearer understanding of septic tank standards and motivated them to educate local residents. As a result, 53.75 percent of participants reported understanding the standards very well, 36.35 percent understood them, and 10 percent had a basic understanding.

Table 2. Response Scale of Bandung Administration Staff

Category	Staff	
	Mean	Mode
Relevance to current issues	4.46	5
Effectiveness of delivery	4.41	4
Innovation of the materials	4.40	4

Source: Questionnaires

The effectiveness of the project in enhancing understanding is linked to the materials provided during the training sessions. The majority of civil servants who participated in the BKG project's training sessions found the materials relevant to the existing conditions of wastewater management in Bandung. Approximately 62.96 percent strongly agreed that the materials were very relevant to Bandung's current situation, corresponding to a score of 5. The highest mean score indicates that a large proportion of staff view the training content as a very closely aligned with Bandung's wastewater management challenges. The trainers also delivered the content effectively, with 59.26 percent of participants stating that the delivery was very clear and very effective, and 28.40 percent reporting that it was clear and effective. This corresponds to a score of 4, indicating that the materials were

generally delivered effectively. Participants further noted that the materials introduced new perspectives on wastewater management, particularly the application of Nudge theory in community education. The aspect also received a score of 4, suggesting that the training materials are generally considered innovative. Most participants regarded the introduction of Nudge theory as an innovative approach to addressing wastewater challenges in Bandung.

The BKG project’s training sessions effectively encouraged civil servants to apply Nudge theory in community education. Overall, 91.25 percent of participants (52.50% strongly agree and 38.75% agree) reported that the sessions motivated them to adopt this approach. They emphasized that they sought to incorporate Nudge theory as an important part of their strategy for educating residents. Using this approach, most participants committed to guiding communities on constructing septic tanks properly and discouraging the direct disposal of waste into water sources. This commitment was further reflected in the survey results, where 96.25 percent of respondents (58.75% strongly agree and 37.50% agree) stated that the sessions motivated them to take these actions.

The BKG project’s training sessions have also proven effective in motivating teachers to educate their students on proper waste management. Teachers from Elementary School SDN 079 Kopo Pajagalan, who participated in the training on February 11, 2025, reported that the materials provided were practical and could be directly applied in the classroom. Most participants agreed on this point, with 68.8 percent rating the materials as very practical and 25 percent as practical. The content was easy to understand and implement because the trainers used teaching aids during the sessions. The delivery of the materials was also well-received: 62.5 percent of participants rated it as very good and 37.5 percent as good. When introducing the mascot Si Jalu, an abbreviation of *Siap Jaga Lingkungan* (Ready to Protect the Environment), the trainers used an interactive video. This video helped students better grasp simple waste management practices. Teachers observed the effectiveness of this approach, with 55.6 percent stating that the video very effectively enhanced students’ understanding of waste management and 44 percent saying it was effective. The use of media has a mean of 4.11 and a mode of 4, indicating that the supporting tools, including the Si Jalu video, were considered appropriate and helpful.

Table 3. Response Scale of Teachers

Category	Teachers	
	Mean	Mode
Relevance to current issues	4.05	4
Effectiveness of delivery	4.11	4
Use of media	4.11	4

Source: Questionnaires

Teachers from elementary school SDN 079 reported that the materials provided by the BKG team during the training sessions were relevant to the school’s existing wastewater challenges and suited the needs of both teachers and students. This relevance was reflected in the survey results, with 56.3 percent rating the materials as very relevant and 43.8 percent as relevant. The relevance to current issues has a mean of 4.05 and a mode of 4, suggesting that the training materials are generally perceived as relevant, though not at an outstanding level. The relevance of the training supported the practical implementation of the knowledge gained. Teachers noted that students’ knowledge increased, with 44.4 percent reporting a big increase and 27.8 percent reporting a very big increase. This growth in knowledge led to changes in behavior: 44.4 percent of teachers observed a big change and 33.3 percent observed a very big change. The behavioral changes centered on how students managed their waste more properly. Furthermore, this proper waste management behavior was consistent, with 83.3 percent of respondents confirming its consistency.

Elementary school SDN 079 reported notable improvements in students’ waste management practices following the BKG training sessions. Students increasingly developed the habit of separating organic and non-organic waste for recycling, with 66.3 percent of respondents acknowledging the influence of the training on this behavior. Beyond individual practice, students also began encouraging their peers to adopt similar habits. The training also strengthened student participation in school cleaning and waste management activities, with 38.9 percent reporting a big increase and another 38.9 percent reporting a very big increase. These behavioral changes contributed to the development of a stronger waste management culture at SDN 079 after the training. Teachers’ observations further confirmed that this cultural shift was both significant and sustainable, with 44.4 percent describing it as very big and 33.3 percent as big.

According to parents, elementary school students have started putting into practice at home the lessons they learned during the BKG Project’s training sessions. Students from SDN 079 Elementary School, for instance, demonstrated noticeable behavior changes at home after attending the training on February 11, 2025. A large number of them began managing household waste correctly, with 44 percent doing so frequently and 28 percent consistently. A score of 4 indicates that they frequently manage waste correctly, although not always. The training

had a positive impact on their waste management habits, with 37 percent of students showing moderate improvement and 44 percent showing significant improvement.

Additionally, parents noted that some children encouraged their friends to adopt responsible waste management practices. This initiative highlighted the SDN 079 Elementary School students' strong motivation, with 39 percent described as highly motivated and 42 percent as moderately motivated. Their enthusiasm contributed to creating a cleaner and healthier home environment. Students also demonstrated a deeper understanding of the importance of waste management, particularly recycling. As a result of the program, 57 percent of students grasped the importance of recycling, and 23 percent had a strong understanding of the concept. The BKG Project also helped enhance students' overall knowledge of waste management, with 49 percent reporting a substantial increase and 37 percent a moderate increase in understanding.

Table 4. Student Action Scale

Category	Students	
	Mean	Mode
Managing household waste correctly	3.98	4
Encouraging friends	3.68	4
Starting to recycle	3.6	4

Source: Questionnaires

3.2. Discussion

O’Toole (2001) explains that the effectiveness of sister city partnerships can be observed at three levels: associative, reciprocative, and commercial. At the associative level, partnerships are effective in building mutual awareness, understanding, and friendship. At the reciprocative level, they are effective in enhancing skills through education and training. At the commercial level, sister city partnerships are effective in supporting business goals and economic development. This study finds that the Bandung–Kawasaki partnership currently operates at the reciprocative level, mainly through the Bandung–Kawasaki Gesuido (BKG) Project. The BKG Project includes staff exchanges and functions as an educational program that allows knowledge transfer from Kawasaki to Bandung. Through this project, Bandung’s government officials and local communities have strengthened their capacity, awareness, and knowledge to address wastewater management problems. Improvements in understanding of wastewater management were identified through questionnaires distributed to Bandung administration staff, as well as elementary school students and teachers. Behavioral changes were also observed based on responses collected through these questionnaires.

The partnership had already reached the associative level earlier. Bandung and Kawasaki built mutual understanding and trust based on shared concerns about waste and environmental issues, as shown by the signings of memorandums of understanding in 2016 and 2020. This foundation enabled the two cities to move to the reciprocative level with the launch of the BKG Project in 2023. The implementation of the reciprocative relationship involves these key components:

a. Professional exchanges

At the reciprocative level, the BKG Project facilitates regular exchanges between the government employees of the two cities. Since 2023, Bandung officials have visited Kawasaki three times, while Kawasaki officials have visited Bandung at least nine times. During these visits, Kawasaki Waterworks and Sewerage Bureau officials have delivered capacity-building programs for both local government staff and community members in Bandung. For the employees of the Bandung administration, the training mainly involved officials from agencies responsible for waste management, including the Environment Agency, the Water Resources Agency, the Public Housing and Settlement Areas Agency, and the municipal water company, Tirtawening. For the staff of Tirtawening, for example, the training was conducted in August 2025. These programs have significantly improved the city government employees’ understanding of waste management (Fiziarita, interview, August 15, 2025).

b. Involvement of local organizations

Beyond local government, the BKG Project also engages schools, universities, and local organizations in Bandung to ensure broader participation and sustainability. The participating elementary schools include SDN 079 Kopo Pajagalan and SDN 249 Astana Anyar, while Pasundan University serves as the academic partner. Dr. Anni Rochaeni, a lecturer in Environmental Engineering at the university, was involved in supporting research activities carried out jointly by the Bandung and Kawasaki governments. The two schools were designated as pilot sites for the project. Teachers at these schools received training on waste management from both governments and are expected to pass this

knowledge on to students, parents, and the surrounding community. The training sessions were conducted in February 2025 at SDN 079 Kopo Pajagalan and in November 2025 at SDN 249 Astana Anyar (Ekawati, interview, July 11, 2025).

c. Joint development of educational animation

Another important aspect of the reciprocative phase is the collaboration in producing an educational animation titled *Si Jalu*. The Kawasaki government worked with the Bandung Environment Agency to create this video. This video aims to introduce environmental awareness to children from an early age. The animation encourages children not to dispose of waste in rivers and other waterways. The animation was produced by local artists in Bandung, while the Kawasaki government provided input on educational content and key messaging. The concept was inspired by practices in Kawasaki, where animated characters are commonly used as educational tools. In Japan, this approach has been effective in engaging children and promoting awareness of environmental protection and waste management. Kawasaki has two such characters, Wotan and Kappy. Wotan is a blue character symbolizing water, while Kappy is a green figure inspired by a traditional Japanese legend associated with protecting rivers. Drawing from this idea, the Bandung Environment Agency created *Si Jalu* as a local adaptation. The video uses simple and engaging storytelling to explain wastewater issues in Bandung and demonstrate practical solutions, making it easier for children to understand the message (Takehisa, interview, August 18, 2025).

The sister city partnership between Bandung and Kawasaki has not yet moved into the commercial stage because both city governments mainly focus on sharing knowledge. For this reason, they launched the BKG project, which was not intended to generate commercial outcomes. Instead, the project aims to support the development of a circular economy by teaching participants how to recycle wastewater into useful, value-added products. To achieve this, the governments involved local business actors, such as tofu producers and laundry business owners, in the training sessions. These groups were specifically targeted because their business activities are often associated with water pollution. For example, laundry businesses frequently discharge untreated wastewater into rivers, and tofu factories contribute to similar environmental issues. Through the BKG project framework, the city governments seek to encourage these actors to recycle their waste rather than pollute waterways. However, the spread of this innovation is still at an early stage and has not yet been widely adopted by small and medium enterprises in Bandung (Setiawan et al., 2025, p. 194).

The evidence that the Bandung–Kawasaki sister city partnership has generated reciprocative outcomes highlights its practical value, especially in the context of ongoing theoretical debates about the main actors in international relations. In realism, states are considered as the primary actors. As such, states are viewed as unitary and sovereign entities that independently determine how to address internal and external challenges. Realists assume that states make purposive and strategic decisions based on their interests and the constraints of the international system, with survival as their primary objective. From this perspective, non-state actors are secondary or largely irrelevant (Karmilawaty & Janvy, 2024; Schmidt & Wight, 2023, p. 176). In contrast, liberalism assigns significant importance to non-state actors, such as individuals, communities, and international organizations. In liberalism, individuals and communities play crucial actors. Liberalists argue that states represent the interests of individuals and communities in society. Accordingly, governments are tasked with translating the interest of individuals and communities into state policies (Rosyidin, 2022, p. 139). Amid this theoretical debate, this study aligns with realism by arguing that states remain the primary actors, as evidenced by the roles of the governments of Bandung and Kawasaki. The significance of the state is reflected in how these city governments establish the sister city partnership and utilize it to generate reciprocative outcomes that benefit society in Bandung through the BKG Project. In this study, the term “state” is used in an extended sense to include subnational actors because city governments, such as the Bandung administration, can be understood as sub-state entities.

The findings of this study contribute to addressing a gap in the existing literature on the motivations behind paradiplomacy in establishing sister city partnerships. According to the existing literature, subnational governments engage in paradiplomacy to establish sister city partnerships based on four primary motivations: economic interests, cultural and linguistic factors, political goals, and cross-border housekeeping. Kuznetsov, p. (2015, p. 100) argues that city governments establish sister city partnerships to engage in international cooperation, with the expectation of maximizing economic benefits. Similarly, Oddone, p. (2023, p. 4) contends that such partnerships enable cities to integrate into global value chains, thereby gaining access to international markets. These partnerships also facilitate the achievement of political goals, such as strengthening democratic governance (Kuznetsov, 2015, p. 110) and pursuing international recognition and legitimacy (Oddone, 2023, p. 3). Both scholars emphasize that cultural and linguistic factors serve as important incentives. Kuznetsov further notes that regions often seek partnerships with counterparts sharing similar characteristics, including language, culture, and religious identity. Cross-border housekeeping also plays a significant role because it reflects the need for

subnational governments, particularly in border regions, to address critical issues such as environmental management, transportation logistics, emergency response, education, and migration. In addition, Oddone highlights altruistic motives as an important factor, explaining that these are expressed through decentralized cooperation projects aimed at development and mutual support (Oddone, 2023, p. 4). However, this study finds that sister city partnerships are not always driven solely by the factors identified by Kuznetsov and Oddone. The case of Bandung and Kawasaki demonstrates that paradiplomacy may also be motivated by the intention to facilitate knowledge transfer. The governments of Bandung and Kawasaki established their partnership not primarily to pursue economic benefits, cultural or linguistic alignment, political objectives, or cross-border problem-solving, but rather to exchange expertise and technical knowledge. This finding suggests that knowledge transfer can serve as a significant and distinct motivation for cities in different countries to establish sister city partnerships. In this regard, the motivation of knowledge transfer helps address a gap that existing literature has not fully explored.

4. CONCLUSION

This study finds that the Bandung-Kawasaki Gesuido (BKG) project has been effective in facilitating cross-national knowledge transfer from Kawasaki, Japan, to Bandung, Indonesia within the reciprocal phase of the sister city partnership framework. In this phase, the sister city partnership enables the Kawasaki government to improve the understanding of Bandung people regarding wastewater management, including the staff of the Bandung administration, teachers, and elementary school students through the BKG project. The increase in understanding and awareness is reflected in the questionnaires distributed to civil servants, teachers, parents and students, as well as in the interviews and observations carried out during the BKG project's training sessions. This study contributes to demonstrating the concrete implementation and benefits of a sister city partnership at the grassroots level.

However, this study has several limitations. First limitation concerns time constraints. As the BKG project is ongoing, the observation was limited to certain locations, particularly elementary school SDN 079 Kopo Pajagalan, Bandung, which served as the pilot location of the project. Due to time limitations, this study could not observe the implementation of the BKG project at other schools, such as elementary school SDN 249 Astana Anyar. These time constraints also limited the distribution of questionnaires to participants at SDN 079 Kopo Pajagalan only. The second limitation concerns methodology. In analyzing the questionnaires, this study employed a five-point Likert scale and used purposive sampling to select respondents. Although appropriate for this research, this approach may result in selection bias and reduce the generalizability of the findings regarding the effectiveness of the BKG project. This study, therefore, suggests that future research apply different method and involve a wider sample of participants. Further observations should also be conducted at other schools involved in the BKG project, such as SDN 249 Astana Anyar, with questionnaires distributed to teachers and students at those schools. Such an approach would provide a deeper analysis of the effectiveness of the BKG project and strengthen the literature on the effectiveness of sister city partnerships. Further studies also need to be carried out when this Bandung-Kawasaki sister city partnership has entered a commercial phase.

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6. CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

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BIOGRAPHIES OF AUTHORS





Alessandro Kurniawan Ulung   is a lecturer in the Department of International Relations at Universitas Satya Negara Indonesia, Jakarta. He holds his bachelor's degree in International Relations from Universitas Jember and master's degree in International Relations from Universitas Gadjah Mada, Yogyakarta, with a specialization in international politics. His research interests include gastrodiploacy, paradiploacy, human security, and Indonesian foreign policy. He has published his research in reputable national and international journals and has received research fellowship grants from institutions such as the Korea Foundation and the Directorate General of Research and Development, Ministry of Higher Education, Science, and Technology. He can be contacted via email at a.kurniawan.ulung@usni.ac.id.



Pradono Budi Saputro   is a lecturer in the Department of International Relations at Universitas Satya Negara Indonesia, Jakarta. He earned his bachelor's degree in Japanese Studies and his master's degree in International Relations from Universitas Indonesia. His research interests include international security, non-traditional security, international politics, East Asia, and the Indo-Pacific. He is currently a member of the Central Executive Board of the Indonesian Association for International Relations and the Indonesian Association for World Security Studies. He can be contacted via email at pradono.budi@usni.ac.id.



Yuli Setiawan   is a lecturer in the Management Study Program at Universitas Satya Negara Indonesia, Jakarta. He holds his bachelor's degree in Business Administration from Telkom University and master's degree in Vocational Education and Personnel Capacity Building from the Technical University of Dresden, Germany. He is a recipient of the prestigious EPOS-DAAD scholarship and has also been awarded research grants from the Ministry of Higher Education, Science, and Technology. His academic and professional interests focus on entrepreneurship, marketing, and business development, with particular emphasis on innovation, small and medium enterprise (SME) growth, and human resource capacity building in the business sector. He is actively engaged in research and academic activities related to these fields and is committed to bridging theoretical knowledge with practical applications in industry and education. He can be contacted via email at yulisetiawan@usni.ac.id