



Impact Analysis and Development of Collaborative Communication Models in Public Relations Programs for Mangrove Conservation

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ABSTRACT: Mangrove forests, as coastal ecosystems, play a crucial role in maintaining the sustainability of fishery resources and protecting shores from erosion and storms. However, mangrove degradation continues to escalate, primarily due to human activities such as shrimp pond expansion and uncontrolled logging. Public Relations programs can serve as effective tools to raise awareness and engage communities in mangrove conservation. Impact analysis and the development of a collaborative communication model are key to understanding the effectiveness of such programs. This research aims to analyze the impact of the Public Relations program on mangrove conservation and develop a more effective collaborative communication model. The focus is on understanding behavioral changes, community responses, and the program's contribution to the sustainability of the mangrove ecosystem. The research methodology employed is qualitative-descriptive with an impact analysis approach. Interviews with representatives from local communities, local governments, non-governmental organizations, and Public Relations practitioners were conducted to gather data. Content analysis was also performed on the program's communication materials. The research findings indicate that the Public Relations program has positively impacted the increase in community awareness and behavioral changes related to mangrove conservation. However, challenges persist concerning environmental uncertainties and the lack of participation from certain segments of the community. A collaborative communication model integrated with mangrove conservation theories, impact analysis, and community engagement proves essential for further improvement. The implications of this research reflect the importance of impact analysis and developing collaborative communication models in Public Relations programs for mangrove conservation. These findings underline that active collaboration with various stakeholders is key to ensuring the sustainability of mangrove ecosystems.

Keywords: Mangrove, Public Relations, Collaborative Communication, Community Engagement.



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INTRODUCTION

Mangrove forests are unique and very important coastal ecosystems that grow in the border areas between land and shallow sea waters. Mangroves consist of various types of plants that have special adaptation abilities to live in salt water and muddy conditions (Arifiyama & Widiarti, 2022). Mangrove trees, such as Rhizophora, Avicennia, and Sonneratia, have strong root systems and are able to survive tidal conditions, making them natural barricades that protect coastal areas from abrasion, high waves, and tropical storms. The existence of mangrove forests provides various benefits for the environment and humans. In addition to providing important habitat for various species of fish, mollusks and birds, mangroves also act as significant carbon sinks, helping to reduce the impacts of climate change (Putri et al., 2023). In addition, mangrove forests also support local fishermen by providing abundant fish resources and providing protection against natural disasters. Therefore, the preservation and restoration of mangrove forests is essential in maintaining biodiversity and ensuring the sustainability of coastal ecosystems throughout the world.

Mangrove forests have a very significant role in maintaining the sustainability of fish resources. Mangroves function as a habitat for various types of fauna, including fish, shrimp and crabs, and act as spawning, foraging and breeding places for these animals, which in turn provides economic benefits for fishermen. In this case, (Marwan & Isnaeni, 2022) stated that ecologically and biologically, mangroves play an important role as spawning grounds, feeding grounds and nursery grounds. From a physical perspective, mangrove forests have a vital function in protecting beaches from abrasion, sea water intrusion and wind. Apart from that, mangrove forests also contribute to reducing greenhouse gas emissions such as CO, CO₂, SO_x and NO_x in the air, as well as minimizing pollutants in coastal waters. Even though it has great potential, data from the Directorate General of Land Rehabilitation and Social Forestry in 2006 showed that of the 8.6 million hectares of mangrove forest in Indonesia in 1999, around 5.3 million hectares were damaged. According to FAO (2005), in 2005, the area of mangrove forests in Indonesia only reached 3,062,300 hectares, or 19% of the total area of mangrove forests in the world. The latest data from the Indonesia Maritime Institute in 2019 shows that around 48% or 4.51 million hectares of Indonesian mangrove forests experienced moderate damage, while 23% or 2.15 million hectares experienced heavy damage. According to research, this damage is mostly caused by human activity in the form of pond expansion and uncontrolled logging of mangroves (Cahyono et al., 2022).

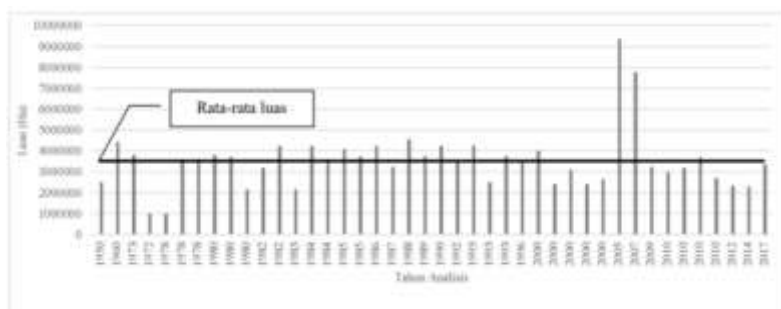


Figure 1. Histogram of the diversity of mangrove forest area in Indonesia from year to year

The extent of mangrove land in Indonesia resembles a roller-coaster, fluctuating with changes in government. Data from the Directorate General of Land Rehabilitation and Social Forestry (RPLS) obtained through Landsat satellite imagery with manual interpretation in 2007 recorded a total of 7,758,410 hectares of mangrove land across Indonesia. Two years later, in 2009, there was a significant decrease in the mangrove land area documented by the Geospatial Information Agency, using satellite imagery and the same method, reducing it to 3,244,018 hectares in Indonesia. These figures continued to experience significant fluctuations until 2017, according to the Mangrove Map of Indonesia using Landsat Satellite Imagery from the Geospatial Information Agency with manual interpretation. It released the total mangrove land area in Indonesia as 3,361,216 hectares. Additionally, National Geographic Indonesia in 2019 stated that 50% of mangrove forest areas had disappeared. Further research indicated that 80% of mangrove forests on Java Island had suffered damage, with only 99 hectares of mangrove forest remaining in Jakarta out of the originally available 300 hectares, still showing signs of 'life'. Moreover, Indonesia was once known as the country with the largest mangrove land, covering 3.5 million hectares, representing 20% of the world's total mangrove land. Unfortunately, it is currently undergoing continuous land degradation.

The Public Relations (PR) program is a series of communication strategies designed to build, maintain and improve the positive image of an organization or entity in the eyes of the public. The main goal of a PR Program is to create good relations between the organization and various stakeholders, including employees, customers, the media, and the general public ([Fadlillah et al., 2022](#)). By using a variety of communication tools, such as press releases, press conferences, social media, and public events, PR programs aim to convey messages that support the goals, values, and positive reputation of the organization. Apart from that, the PR Program also plays an important role in managing and responding to various issues and crises that can affect the image of the organization ([Hertati, 2020](#)). By understanding the dynamics of communication and community needs, the PR Program can design effective campaigns to maintain community trust and support. Overall, a PR program is not just a means of promoting products or services, but also a strategic tool for building relationships of mutual trust, understanding community needs, and achieving organizational goals in an ever-changing environment ([Adibrata, 2023](#)).

One strategy that can be implemented to overcome the destruction of mangrove forests in Indonesia is to build Collaborative Communication through a Public Relations Program which focuses on providing understanding to the public about the importance and urgency of mangrove conservation ([Efendi & Astuti, 2021](#)). Collaborative Communication in this context involves various parties, such as the government, non-governmental organizations, the business world, and the general public, to jointly create awareness and concrete action in protecting the mangrove ecosystem. Public Relations programs can design communication campaigns that build narratives that emphasize the ecological and economic benefits of mangrove forests, as well as the negative impacts that can arise due to damage to this ecosystem. Through the use of various media, including social media, public events, and educational literature, the Public Relations Program can create a platform for dialogue and exchange of information between various stakeholders ([Khaza Sukma Sakinah & Renata Anisa, 2023](#)). This collaboration creates space to share knowledge, experience and solutions that can be implemented together to support mangrove conservation. By

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gathering community support through Collaborative Communication, it is hoped that collective awareness will be formed about the importance of mangrove conservation. In this way, communities can be actively involved in conservation measures, reduce activities that are detrimental to mangrove forests, and participate in restoration programs to restore damaged mangrove ecosystems. This initiative requires not only individual understanding, but also collective support to achieve sustainability and maintain the balance of coastal ecosystems ([González-Ibáñez et al., 2013](#); [Schaffers, 2018](#)).

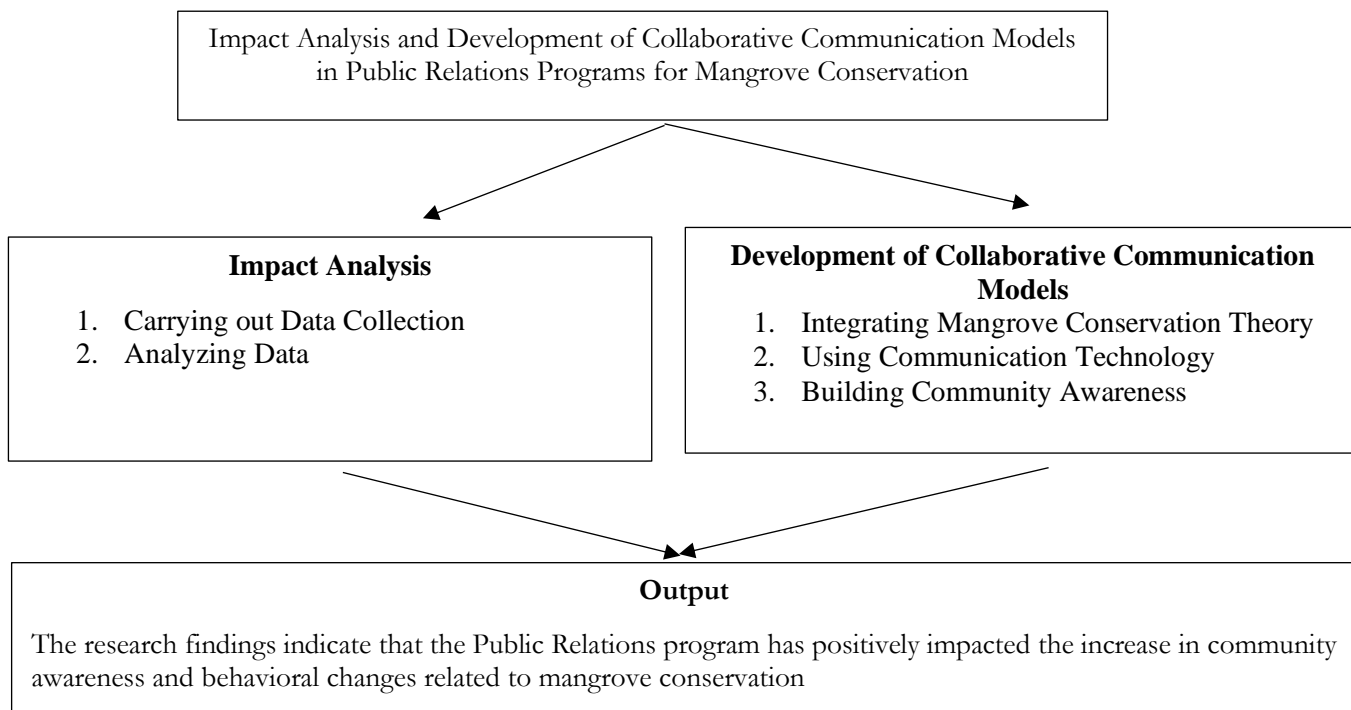
Mangroves as a coastal ecosystem that is rich in biodiversity, have a very vital role in maintaining the balance of the marine environment and protecting coastal areas from the impacts of natural disasters such as storms and tsunamis. However, mangroves currently face serious threats due to human activities, such as deforestation, climate change and marine pollution. Therefore, mangrove conservation efforts are very important to ensure the sustainability of this ecosystem. In this context, the role of the Public Relations (PR) Program becomes increasingly crucial in increasing public awareness and mobilizing support for mangrove conservation efforts. However, to achieve maximum effectiveness, it is necessary to develop a collaborative communication model that combines various parties involved, including the government, non-governmental organizations, the business world and the general public. Impact Analysis and Development of Collaborative Communication Models are essential steps in increasing the efficiency and effectiveness of the Public Relations Program ([Mumpuni & Wati, 2022](#)).

Mangroves not only serve as a habitat for various marine species, but also protect coasts from abrasion and help in overcoming climate change through carbon sequestration. The sustainability of mangroves supports marine life and humans, making them a key element in coastal ecosystems. Human activities such as forest encroachment, coastal development and increasing levels of marine pollution have resulted in the degradation of the mangrove ecosystem. In facing this challenge, the Public Relations Program has a strategic role in creating understanding and awareness among the community.

In overcoming the complexity of mangrove conservation issues, close collaboration between various stakeholders is needed. A collaborative communication model will enable more effective exchange of information, coordination of actions, and mobilization of collective support for mangrove conservation goals. Impact Analysis provides in-depth insight into the effectiveness of the program and its impact on community understanding. Using this analytical method will help assess the extent to which the Public Relations Program has convinced and mobilized the community in supporting mangrove conservation. By understanding this background, it can be seen that the integration of Impact Analysis and Development of Collaborative Communication Models in the Public Relations Program is a strategic step to overcome the challenges of mangrove conservation in a holistic and sustainable manner.

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METHOD

This research uses descriptive qualitative methods to conduct Impact Analysis and Develop a Collaborative Communication Model in the Public Relations Program for Mangrove Conservation. A qualitative approach was chosen because this research aims to understand in depth the impact of the Public Relations Program on community awareness and participation in mangrove conservation, as well as to detail the factors that support or hinder the effectiveness of the program (Sugiyono, 2017). The initial step involves a literature study to understand theories related to mangrove conservation, impact analysis, and collaborative communication models. Field research was then carried out by conducting in-depth interviews and focus group discussions with various related parties, the informants in this research were representatives of the local community, regional government, non-governmental organizations and Public Relations practitioners. The collected data was then analyzed qualitatively to explore the impact of the Public Relations Program and identify factors that influenced the development of collaborative communication models.

Developing a Collaborative Communication Model in the Public Relations Program for Mangrove Conservation involves the design stage of a communication strategy that involves all stakeholders. In this research, workshops and consultation sessions will be held to design a model that is effective and relevant to local conditions. Active participation of various parties will be promoted, and communication strategies will be developed taking into account the diversity of backgrounds, interests and needs of local communities. After implementing the model, an impact analysis will be carried out by collecting feedback from program participants, the community and other related parties (Sugiyono, 2018). This qualitative data will be evaluated to evaluate the success of the collaborative communication model in increasing awareness and participation in mangrove

conservation efforts. Through this descriptive qualitative approach, this research aims to provide an in-depth and contextual understanding of the impact of the Public Relations Program and the effectiveness of the Collaborative Communication Model in the context of mangrove conservation.

In the study on "Impact Analysis and Development of Collaborative Communication Models in Public Relations Programs for Mangrove Conservation," data analysis techniques and tools used are crucial for delving into in-depth information and supporting the formulation of effective models. Here is a discussion about the data analysis techniques and tools that might be employed:

1. Content Analysis:

This technique is useful for exploring messages and information in communication materials, such as documents, press releases, and promotional materials. Sorting and in-depth understanding of this content can provide insights into the focus, tone, and effectiveness of conveyed messages.

2. Impact Analysis:

Involves evaluating the consequences or impact of Public Relations programs on society and the environment. This may include changes in behavior, increased awareness, or contributions to mangrove conservation.

3. Multivariate Analysis:

If there are interrelated variables, multivariate analysis such as regression or factor analysis can assist in understanding the complex relationships between these variables.

RESULTS AND DISCUSSION

According to ([Patrianti et al., 2020](#)) Mangrove conservation theory refers to the views and principles that underlie efforts to preserve and sustain the mangrove ecosystem. One of the main concepts in this theory is understanding the biodiversity and unique ecosystems in mangrove forests. This theory emphasizes the importance of involving communities in conservation efforts, identifying threats to mangrove ecosystems, and designing sustainable strategies to maintain mangrove sustainability. According to ([Tarwiyani Yuniar et al., 2022](#)) In the context of Impact Analysis, theories are used that focus on understanding the consequences of a program or policy. This theory includes methods for evaluating the positive and negative impacts of Public Relations Programs in mangrove conservation. In choosing a theory, the concepts of social and ecological impact assessment such as social impact theory and environmental impact analysis can provide an in-depth view of the program's effects on society and the environment ([Patrianti & Shabana, 2020](#)).

According to ([Nurhidayatullah & Sugiyanto, 2023](#)) Collaborative communication theory includes an understanding of how communication can be a tool for building cooperation between various stakeholders. The collaborative communication model will combine concepts from

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communication theory, conflict management, and interorganizational cooperation. Through this approach, efforts to integrate various perspectives and interests in the Public Relations Program for mangrove conservation can be strengthened. According to [\(Sentanu & Mahadiansar, 2020\)](#) Public Relations and Ecological Theory tries to understand the relationship between Public Relations practices and ecological sustainability. Concepts such as green PR, CSR (Corporate Social Responsibility), and sustainable communication become relevant in the context of the Public Relations Program for mangrove conservation. This theory provides a basis for understanding the role of communication in creating public awareness and support for mangrove conservation [\(Setiyarini & Chrismardani, 2022\)](#).

According to [\(Sofiyawati, 2022\)](#) Community involvement theory is important in designing effective Public Relations Programs. The concepts of community participation, community-based approaches, and joint development are key elements that need to be considered in understanding how to optimally involve the community in mangrove conservation efforts [\(Niko, 2022\)](#).

The integration of these theories is crucial in designing a holistic approach for Impact Analysis and Collaborative Communication Model Development. Through combining mangrove conservation theory, impact analysis, collaborative communication, public relations and ecology, and community involvement, this program can be designed to be more sustainable, relevant and effective in achieving mangrove conservation goals. In the context of mangrove conservation, theoretical inquiry is the foundation for understanding, designing and evaluating Public Relations Programs. The use of mangrove conservation theory, impact analysis, collaborative communication, public relations and ecology, and community involvement provides a solid basis for developing sustainable strategies in maintaining the sustainability of mangrove ecosystems and supporting global efforts to preserve the coastal environment.

The results of interviews with local community representatives provide an in-depth understanding of their perceptions and level of involvement in the Public Relations Program. The majority of respondents expressed awareness of the importance of mangrove conservation, but some also expressed uncertainty regarding the real impact of the program at the local level. Factors such as level of education and understanding of the mangrove ecosystem influence the level of participation and support of local communities. Therefore, these results indicate that the development of collaborative communication models must consider approaches that can address multiple levels of understanding and ensure inclusion of all levels of society.

Interviews with local government representatives suggest that there is strong support from the government in carrying out mangrove conservation programs. However, there are challenges in budget allocation and inter-agency coordination. Some respondents also highlighted the need to strengthen regulations and supervision regarding mangrove exploitation. This analysis shows that the success of the Public Relations Program depends not only on the level of government support, but also on good integration between public and private initiatives and joint efforts between agencies.

The results of interviews with representatives of non-governmental organizations highlight their crucial role in supporting mangrove conservation. These institutions have a deep understanding

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of the challenges and potential solutions that can be proposed in the development of collaborative communication models. They emphasized the importance of involving the community directly and collaborating with other parties to achieve positive impacts. This shows that non-governmental organizations can be strategic partners in developing effective collaborative communication models.

Interviews with Public Relations practitioners revealed that the effectiveness of the Public Relations Program in mangrove conservation is highly dependent on active and continuous involvement with all stakeholders. They highlight the need to adopt communication strategies that focus on stories and narratives that can embrace people's feelings and values. A deep understanding of the audience, appropriate use of media, and continuous assessment of program impact are key elements identified by Public Relations practitioners to ensure program success. The results of interviews with various related parties show that the success of the Public Relations Program in mangrove conservation requires a holistic and collaboration-based approach. Integration of understanding and expectations from local community representatives, regional government, non-governmental organizations, and Public Relations practitioners is the key to formulating an effective collaborative communication model. A deep understanding of the local context, an inclusive approach, and continued cooperation between all stakeholders are important foundations in developing a communication model that is capable of achieving positive and sustainable impacts in mangrove conservation efforts.

Based on mangrove conservation theory, this research emphasizes that understanding biodiversity and the unique ecosystem in mangrove forests is the main basis for conservation efforts. Aligning this with impact analysis theory, there is a deep understanding of the consequences of the Public Relations Program on society and the environment in the context of mangrove conservation. In this case, the theories of collaborative communication, public relations, ecology and community involvement are crucial foundations for designing holistic strategies. Interviews with local community representatives demonstrated significant awareness regarding mangrove conservation, but also revealed uncertainty surrounding the program's impact at the local level. Education and understanding of the mangrove ecosystem emerged as key factors influencing local community participation and support. Therefore, these results highlight the importance of developing collaborative communication models that are inclusive and can touch various levels of community understanding.

Interviews with local governments showed strong support, but also highlighted challenges related to budget allocation and inter-agency coordination. This emphasizes the importance of integrating public and private initiatives as well as inter-agency collaboration to achieve sustainable mangrove conservation. Representatives of non-governmental organizations demonstrated their crucial role as strategic partners in supporting mangrove conservation. They emphasized the importance of involving the community directly and collaborating with other parties to achieve positive impacts. Therefore, these results indicate that non-governmental organizations have the potential to become major players in collaborative communication models. Interviews with Public Relations practitioners highlight active and continuous involvement as the key to the success of Public Relations Programs. Communication strategies that focus on stories and narratives, appropriate

use of media, and continuous assessment of program impact are key elements that need to be considered.

Thus, the conclusion of this research confirms that the success of the Public Relations Program in mangrove conservation requires a holistic and collaboration-based approach. The integration of mangrove conservation theory, impact analysis, collaborative communication, public relations and ecology, and community involvement is essential to formulate an effective and sustainable communication model in protecting mangrove ecosystems and supporting global efforts to preserve the coastal environment.

Analysis of the Impact of the Public Relations Program

The Public Relations (PR) program plays a vital role in bridging an organization or project with the community and stakeholders. Analysis of the impact of PR programs is very important to evaluate the extent to which the program achieves objectives and makes positive or negative contributions to various aspects. In this context, the main focus of the discussion will be placed on analyzing the impact of PR programs, involving various dimensions such as social, ecological, economic and organizational reputation ([Hasnanda et al., 2021](#)).

1. Social Impact

The social impact of a PR program can be assessed from the extent to which the program influences the local community. First, it is necessary to evaluate the level of public awareness regarding the issues or messages conveyed by the PR Program. Has the program succeeded in increasing public understanding of the objectives of mangrove conservation? If yes, to what extent is this awareness reflected in people's daily behavior? Next, it is necessary to analyze whether the PR Program has a positive impact on the level of community participation. Is there an increase in participation in mangrove conservation activities or other related programs? Factors such as level of engagement, willingness to contribute, and level of community support need to be measured to evaluate the program's overall social impact. Social impact also involves analysis of the formation of public perceptions of the organization or party that initiated the PR Program. Has this program succeeded in building a positive image among the community? The extent to which this program helps create positive relationships between the organization and the Community ([PURWANTI et al., 2021](#)).

2. Ecological Impact

The ecological impact of the PR Program needs to be measured by considering its contribution to the preservation and balance of the mangrove ecosystem. This analysis can begin by evaluating the extent to which the program has succeeded in involving the community in mangrove conservation efforts. Has there been an increase in mangrove restoration activities or habitat preservation? Furthermore, evaluations can be carried out on the direct impact on the mangrove ecosystem. Has the PR Program led to improvements in water quality, sustainability of marine life, and overall improvement in mangrove conditions? Measuring indicators such as mangrove growth rates, species diversity and ecosystem health can provide a more accurate picture of ecological impacts. It is also important to evaluate any negative impacts that may arise from implementing a PR Program, such as potential disturbance to wildlife or other undesirable consequences. In the

ecological impact analysis, it is necessary to consider the long-term sustainability of mangrove conservation efforts initiated through the PR Program ([Bahrul Ulumi & Syafar, 2021](#)).

3. Economic Impact

Analysis of the economic impact of the PR Program relating to its contribution to the local and national economy. In the context of mangrove conservation, it is necessary to evaluate whether this program opens up new economic opportunities for local communities. Is there an increase in the tourism sector, sustainable agriculture, or small businesses related to mangrove conservation efforts? Next, it is necessary to pay attention to whether the PR Program has a positive impact on the livelihoods of local communities. Has there been an increase in access to employment, training, or increased community economic capacity? In this analysis, it is important to understand whether the program is successful in creating added economic value that can be felt by the local community. However, it is also important to remember to identify potential negative impacts on the economy, such as changes in land use patterns that could affect traditional livelihoods or local economic structures. By considering these two sides, economic impact analysis can provide a more complete picture of program sustainability.

4. Impact of Organizational Reputation

In the context of analyzing the impact of a PR program, the reputation of the organization or party initiating the program is a crucial aspect that needs to be evaluated. The success of a PR program should be reflected in improving the organization's image and reputation in the eyes of society, government and other stakeholders. Reputation evaluation can be done through media monitoring, public surveys, and analysis of public opinion towards the organization. An increase in positive perceptions of an organization's social and environmental responsibilities can be considered a positive impact of a PR Program. However, it is also necessary to pay attention to whether there are any negative impacts that may arise from this program, especially if there is a mismatch between the message conveyed by the PR Program and the reality of its implementation. This analysis can help organizations understand the extent to which the program is impacting their reputation and identify areas for needed improvement.

Public relations program impact analysis essentially involves an in-depth assessment of the program's contribution to various dimensions, including social, ecological, economic, and organizational reputation. A holistic understanding of program impacts can provide valuable insights for sustainable program improvements and provide maximum benefits for the communities and environment involved ([Hagger et al., 2022](#)).

Evaluation of the Effectiveness of Collaborative Communication

Evaluation of the effectiveness of collaborative communication is an important step in analyzing the extent to which a program or initiative involving various parties can achieve its collaborative goals. In the context of mangrove conservation, where the involvement of many stakeholders is required, this evaluation is crucial to ensure that communication is effective, encourages collaboration, and achieves the desired results. This discussion will explore several key dimensions in evaluating the effectiveness of collaborative communication and how this evaluation can enrich mangrove conservation programs ([Swangiang & Kornpiphat, 2021](#)). Before entering into an

effectiveness evaluation, it is important to understand the context of collaborative communication in mangrove conservation programs. This involves identifying stakeholders, establishing shared goals, and establishing a communication structure. This context is the main basis for assessing the extent to which collaborative communication can run according to plan and support goal achievement.

In the context of mangrove conservation, stakeholders may involve local governments, local communities, non-governmental organizations and related business sectors. Common goals can include preserving mangrove ecosystems, improving the welfare of local communities, and establishing policies that support conservation. A good communication structure will facilitate the exchange of information, coordination of actions, and active involvement of all parties. The initial step in evaluating the effectiveness of collaborative communication is the development of indicators that can measure its results and impact. These indicators should include aspects such as the level of stakeholder participation, smooth flow of information, shared understanding of goals, and desired changes in behavior or actions ([PUTRI et al., 2020](#)).

Evaluation methods may involve a combination of interviews, surveys, document analysis, and direct observation. Interviews with stakeholders can provide in-depth understanding of their perceptions regarding communication effectiveness. Surveys can be used to collect quantitative data, while document analysis can examine records and communication materials that have been distributed. Direct observation can provide a direct picture of the dynamics of communication in meetings or collaborative activities ([Nugroho & Sari, 2023](#)). The effectiveness of collaborative communication can be measured through the level of participation and active involvement of stakeholders. This analysis involves assessing the extent to which all parties are actively involved in information exchange, discussion, and decision making. A high level of participation reflects openness and a desire to work together towards common goals.

It is important to check whether all stakeholders have equal access to information and whether special efforts are made to ensure participation of those who may be underrepresented. This analysis provides insight into the extent to which collaborative communication achieves inclusivity and reflects democratic principles in decision making ([Hasan et al., 2022](#)).

The effectiveness of collaborative communication also depends on the extent to which information flows smoothly between stakeholders. This analysis includes evaluating the communication channels used, the extent to which messages can be understood well, and whether there are any obstacles to the exchange of information. It is important to check whether a shared understanding of goals, values and expectations has been established between all parties. This evaluation can be carried out through content analysis of communication messages, joint reflection sessions, or discussion forums designed to explore mutual understanding.

The ultimate goal of collaborative communication is to trigger behavior change or action that supports shared goals. Evaluation of effectiveness should include monitoring whether collaborative communication has had a real impact in driving positive change. This could include policy changes, sustainable practices, or active participation in mangrove conservation activities. It is important to identify whether there are other factors that could influence behavior change, such

as economic changes or external policy changes. This analysis provides an overview of the extent to which collaborative communication can achieve real action goals and create a sustainable impact ([Seva et al., 2022](#)).

Evaluation results must be integrated back into the program to support continuous improvement. Evaluation findings can be used to identify areas of weakness, adjust communication strategies, and improve collaborative interactions. A continuous feedback process will ensure that collaborative communications become more adaptive and responsive to stakeholder needs and expectations. Evaluating the effectiveness of collaborative communication is a complex but important step in the context of mangrove conservation. By understanding the context, developing appropriate indicators, and analyzing various aspects of participation, information flow, and behavior change, evaluation can provide in-depth insight into program performance. Using evaluation results for continuous improvement will help optimize collaborative efforts to support mangrove conservation and achieve sustainable positive impacts ([Yasir et al., 2022](#)).

3. Recommendations for Developing Collaborative Communication Models

The collaborative communication model plays a central role in mangrove conservation efforts involving various stakeholders. In this context, this discussion will explore comprehensive recommendations for the development of more effective and sustainable collaborative communication models. These recommendations cover various aspects, from stakeholder participation, communication structures, to the use of technology, with the aim of increasing collaboration and strengthening positive impacts on mangrove conservation ([Chamberland-Fontaine et al., 2022](#)).

1. Increasing Stakeholder Participation

Strong participation from all stakeholders is the key to the success of a collaborative communication model. Therefore, steps need to be taken to increase the level of participation from various parties. One of the main recommendations is to hold regular participatory forums involving local governments, local communities, non-governmental organizations and related business sectors. This forum can be a platform for sharing information, listening to different perspectives, and designing strategies together. In addition, it is necessary to implement an inclusive approach that ensures that all levels of society have a voice in the decision-making process. Training and education programs can be used to increase the capacity and understanding of local communities regarding the importance of mangrove conservation. This can include education about mangrove ecosystems, their benefits for the environment and society, and their role in maintaining sustainability.

2. Optimizing Collaborative Communication Structures

The effectiveness of a collaborative communication model also depends greatly on the structure and communication mechanisms implemented. The main recommendation is to optimize existing communication channels and provide more space for information exchange. The communication system must be open, transparent and easily accessible to all stakeholders. It is important to design a systematic feedback mechanism, where stakeholders can provide input, suggestions and

evaluations on a regular basis. This can be done through surveys, evaluation meetings, or online platforms that facilitate interaction between stakeholders. In this way, communication structures can be dynamically adjusted according to contextual needs and changes.

3. Utilization of Technology for Effective Communication

Modern technology can be an effective tool in improving collaborative communication. Recommendations include leveraging online platforms, mobile applications, and social media to facilitate rapid and widespread exchange of information. Creating a special website or communication portal can be a means of providing the latest news, educational materials and online discussion spaces. Apart from that, the use of geospatial technology can provide a better picture of the condition of the mangrove ecosystem and the changes that occur. Digital mapping can be used to involve stakeholders in monitoring mangrove conditions in real-time. This technology can provide a strong data base for discussion and joint decision making.

4. Building Community Awareness and Support Through Story-Based Communication

It is important to develop collaborative communication models that can embrace people's feelings and values. This recommendation includes the use of story-based or narrative-based communication to convey mangrove conservation messages in a persuasive and inspiring manner. Success stories from local communities, successful restoration projects, or visible positive impacts can help shape a positive and supportive view of the community. Communication programs can also utilize local arts and culture to convey the message of mangrove conservation in a way that is closer to people's hearts. Performing arts, visual artwork, and other cultural activities can be powerful vehicles for conveying information, generating a sense of local pride, and increasing community support.

5. Sustainability System Integration and Impact Measurement

It is important to include elements of sustainability in collaborative communication models. These recommendations include the development of an integrated impact measurement system, which not only measures program success in the short term but also monitors long-term changes. Clear and measurable metrics must be developed to assess the program's impact on the sustainability of mangrove ecosystems and the welfare of local communities. Integrating the concept of Corporate Social Responsibility (CSR) in a collaborative communication model can also increase support from the business sector. Collaboration with companies that have interests in the area can create mutually beneficial partnerships and contribute positively to mangrove conservation programs.

In the context of mangrove conservation, challenges and uncertainty are inevitable elements. Therefore, recommendations include developing communication strategies that can wisely address these challenges and uncertainties. Building openness regarding environmental uncertainty, climate change, or other factors that may influence mangrove sustainability is an important step. It is also important to communicate the steps taken to overcome these challenges and involve stakeholders in the decision-making process to increase legitimacy and support ([Yasir et al., 2021](#)). These recommendations reflect efforts to develop a collaborative communication model that is not only effective in supporting mangrove conservation but also sustainable and responsive to contextual changes. Through increasing participation, optimizing communication structures, utilizing

technology, developing public awareness, integrating sustainability, and addressing challenges, it is hoped that the collaborative communication model can become a strong tool for achieving the goal of holistic and sustainable mangrove conservation.

CONCLUSION

From the entire discussion above, it can be concluded that the impact analysis and development of a collaborative communication model in the Public Relations program for mangrove conservation, it can be concluded that joint efforts involving various stakeholders are the key to the sustainability of the mangrove ecosystem. Collaborative communication, as this analysis reveals, is not just an instrument for conveying messages, but moreover, is the foundation for positive change. An effective Public Relations program not only provides information about the importance of mangrove conservation, but also involves, listens to, and embraces various community groups. The collaborative communication model integrated with the mangrove conservation program has had a profound impact on the active involvement, participation and support of local communities, regional governments, non-governmental organizations and related business sectors.

In this context, developing a collaborative communication model is not just a task, but an ongoing journey. The steps outlined in this analysis provide an overview of how this model can continue to develop, adapt and strengthen its positive impact. With an emphasis on inclusive participation, optimizing communication structures, utilizing technology, story-based approaches, integrating sustainability, and addressing challenges, this model can become more resilient and responsive to the complex dynamics of mangrove conservation. Through impact analysis, we see that the collaborative communication model not only contributes to the level of public awareness, but also to changes in behavior, policies and real actions. The emphasis on holistic impact measurement, integrating ecological, social and economic aspects, provides a strong basis for assessing the overall effectiveness of mangrove conservation programs.

Mangrove conservation is not just the responsibility of an individual or group of people, but a collective struggle. The collaborative communication model, through the Public Relations program, represents a bridge that connects various communities and stakeholders in a joint effort to maintain the sustainability of the mangrove ecosystem. In this conclusion, we are reminded of the power of transformation that can be realized through inclusive, empathetic and sustainable communication. The implications of this research reflect the importance of impact analysis and developing collaborative communication models in Public Relations programs for mangrove conservation. These findings underline that active collaboration with various stakeholders is key to ensuring the sustainability of mangrove ecosystems. Collaborative communication models not only serve as a means of conveying messages, but also as a foundation for positive change. An effective Public Relations program not only provides information about the importance of mangrove conservation, but also involves, listens to, and embraces various community groups. The integration of collaborative communication models with mangrove conservation programs has a significant impact on the active involvement, participation and support of local communities,

regional governments, non-governmental organizations and related business sectors. Therefore, the results of this research provide encouragement to continue to develop and optimize collaborative communication strategies to support sustainable mangrove conservation efforts.

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