



The Role of Media in Hexa-Helix Collaboration for the Development of UNESCO Global Geopark Kebumen, Indonesia

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Abstract

This study aims to analyze the role of media in Hexa-Helix collaboration in the development of UNESCO Global Geopark Kebumen. This research employs a qualitative approach with a descriptive method, using in-depth interviews, observation, and document analysis. Informants were selected purposively from various actors within the Hexa-Helix model, including government, academia, industry, community, media, and society. The findings reveal that the media plays a strategic role as a knowledge broker in bridging complex geoscientific knowledge with public understanding through processes of translation and knowledge co-production. Furthermore, the media contributes to framing geopark issues, with a dominant promotional narrative emphasizing tourism potential and local identity, although this may limit critical discourse. The media also strengthens communication networks among stakeholders, despite challenges related to inclusivity. In terms of legitimacy, the media helps build public trust in geopark development; however, such legitimacy tends to remain symbolic without substantial public participation. This study proposes the concept of a communicative ecosystem, positioning communication as a central element in Hexa-Helix collaboration. Theoretically, this research contributes to environmental communication and collaborative governance studies, while practically offering recommendations for more participatory and sustainable communication strategies in geopark management.

Keywords: media; Hexa-Helix; geopark; environmental communication; sustainability

INTRODUCTION

Over the past two decades, the global development paradigm has experienced a substantial shift (Awan, 2015; Develtere et al., 2021; Horner, 2020). Traditional development approaches that focused primarily on resource extraction and economic growth are gradually being replaced by sustainable development frameworks that emphasize environmental protection, community empowerment, and multi-stakeholder collaboration (Eweje et al., 2021; Momen, 2021; Wondirad, 2018). The *Sustainable Development Goals* (SDGs) introduced by the United Nations highlight the importance of cross-sector partnerships as a key pillar for achieving inclusive and sustainable governance, particularly as reflected in Goal 17 (Nations, 2015). In the context of natural heritage management, UNESCO promotes the integration of geoh heritage conservation, geoscience education, and local economic development through the *UNESCO Global Geoparks* program (UNESCO, 2023). Currently, more than 200 geoparks across over 45 countries are part of this global network, illustrating how collaborative and place-based governance has become a widely adopted strategy in sustainable regional development (Dowling, 2013).

From a theoretical perspective, collaborative development frameworks have evolved significantly. The *Triple Helix* model initially emphasized the interaction between universities, industry, and government as the core drivers of innovation (Etzkowitz & Leydesdorff, 2000). This

model later expanded into the *Quadruple Helix*, which incorporates civil society as an important actor in innovation systems (Carayannis & Campbell, 2009). More recently, the *Hexa-Helix* framework has been introduced to further broaden this collaborative structure by including media and creative communities as essential actors in knowledge-based development ecosystems. In this framework, development outcomes are shaped through the interaction of multiple stakeholders, including government, academia, industry, society, media, and the environment or regulatory structures. The inclusion of media as a strategic actor reflects the growing importance of information flows, digital communication, and public discourse in shaping development processes. Research on the Hexa-Helix model suggests that synergy among these actors can significantly strengthen sustainable tourism development and regional innovation systems.

The relevance of media within collaborative governance frameworks has become increasingly evident in the digital era. According to the *Digital News Report*, approximately 72% of the global population accesses news through digital platforms (Reuters Institute, 2024). In Indonesia, internet penetration has surpassed 78% of the population, indicating a rapidly expanding digital communication environment. Within this context, media narratives play an influential role in shaping public perception, social legitimacy, and support for development policies. Environmental communication studies highlight that media serves as a public arena where environmental meanings, risks, and sustainability issues are socially constructed and debated (Cox, 2013; Hansen, 2018). Consequently, media does not merely function as a channel of information dissemination but also acts as a mediator that connects stakeholders, frames environmental issues, and influences public engagement in sustainability initiatives.

In the field of geopark studies, previous research has demonstrated that geoparks can function as effective instruments for sustainable regional development. Farsani, *et.al* (2011) argue that geoparks integrate geological conservation, education, and tourism activities to stimulate socio-economic development in rural areas. Similarly, recent studies highlight that geoparks provide an important platform for communicating geoscience and environmental knowledge to the public while fostering community engagement and environmental stewardship. Research also indicates that effective communication strategies can enhance public awareness of geological heritage and encourage community participation in geopark governance. For example, Justice (2018) emphasizes that geoscience communication is a key component in strengthening public understanding of geopark values and promoting sustainable tourism.

Along with the rapid development of digital technologies, media platforms particularly social media have increasingly become important tools in geopark promotion and communication. Digital communication channels enable geopark stakeholders to disseminate information, build destination branding, and foster interactive engagement with local communities and tourists. Studies on geopark communication show that media narratives contribute to shaping public awareness of geopark values such as geological uniqueness, environmental sustainability, and cultural heritage. In addition, digitalization has been identified as a key driver for enhancing geopark management, enabling innovative communication strategies that support tourism development, environmental education, and sustainable policy-making.

Despite these growing discussions, existing studies on geopark development still tend to focus primarily on tourism management, community participation, and administrative governance. While some research highlights the importance of communication and media in promoting geopark destinations, media is often treated merely as a promotional tool rather than as a strategic actor within collaborative governance frameworks. Consequently, the role of media within the *Hexa-Helix* collaboration model remains insufficiently explored in the geopark development context, particularly in developing countries.

The research gap lies in the lack of analysis regarding how media function not merely as promotional channels but as collaborative actors within the Hexa-Helix framework. Existing studies tend to treat media as destination promotion tools rather than as knowledge brokers, issue framers, or legitimacy builders. In the digital era, media have the capacity to shape public perception, mediate conflict, and strengthen stakeholder communication networks.

The urgency of this research is based on data showing that internet penetration in Indonesia has surpassed 78% of the population (Reuters Institute, 2024), creating a rapidly expanding digital communication environment. UNESCO Global Geopark Kebumen possesses significant geological, biodiversity, and cultural heritage. However, geopark development success depends not only on natural resources but also on strategic communication that builds public legitimacy and collective participation. Without understanding media's role, Hexa-Helix collaboration risks being ineffective and non-inclusive.

The novelty of this research lies in integrating environmental communication and collaborative governance perspectives within the Hexa-Helix framework, introducing the concept of a "communicative ecosystem" that positions communication as a structural element in collaboration. This research does not view media merely as an information channel but as an active actor constructing meaning, translating geoscience knowledge, and building public legitimacy. This novelty distinguishes it from previous studies that separate communication from governance.

Within Indonesia, the *UNESCO Global Geopark Kebumen* presents a relevant case for examining this issue. The region possesses significant geological and cultural heritage and holds strong potential for stimulating local economic growth through geotourism and community-based initiatives. However, the success of geopark development depends not only on natural resources and tourism potential but also on effective collaboration among stakeholders and strategic communication processes that foster public legitimacy and collective participation.

Based on this research gap, this study aims to analyze the role of media within the *Hexa-Helix* collaboration framework in the development of UNESCO Global Geopark Kebumen using a descriptive qualitative approach. Theoretically, this research seeks to contribute to the literature on development communication and environmental communication by proposing a conceptual perspective that positions media as a strategic actor within collaborative area-based governance. Practically, the findings are expected to provide insights for policymakers, geopark management authorities, communities, and industry stakeholders in designing integrated, participatory, and sustainable communication strategies that strengthen public legitimacy and support long-term regional sustainability.

METHODS

This study employed a qualitative approach using a descriptive method to obtain an in-depth understanding of the social phenomena related to the role of media in the Hexa-Helix collaboration in the development of the UNESCO Global Geopark Kebumen, Indonesia. Through a descriptive method, this research aims to systematically describe how media roles are constructed, enacted, and contribute to strengthening multi-stakeholder collaboration in geopark development.

The research was conducted in the UNESCO Global Geopark Kebumen area, Central Java, Indonesia. The selection of this site is based on its significant geological heritage, cultural diversity, and tourism potential, as well as the involvement of multiple stakeholders in its management. These stakeholders include local government, academia, community groups, tourism industry actors, and media. The diversity of actors makes Kebumen Geopark a relevant context for examining collaborative dynamics within the Hexa-Helix model, particularly in understanding how media facilitate communication and synergy among stakeholders.

Data were collected through in-depth interviews, observation, and document analysis. In-depth interviews were conducted with purposively selected informants, namely individuals who have direct involvement in geopark development. These informants include geopark management authorities, local government representatives, academics, community members, tourism industry actors, and media representatives. Through these interviews, the researcher obtained comprehensive insights into how media contribute to communication and collaboration among stakeholders.

In addition, observation was employed to directly examine communication activities, forms of collaboration among actors, and various initiatives related to geopark development and promotion. This method enables the researcher to capture how interactions and collaborations are practiced in real contexts. Meanwhile, document analysis was conducted by reviewing official documents, policy reports, media publications, and archival materials relevant to the management and promotion of UNESCO Global Geopark Kebumen.

Data analysis in this study follows the interactive qualitative analysis model proposed by (Miles et al., 2014), which consists of three main stages: data reduction, data display, and conclusion drawing. In the data reduction stage, relevant data are selected, categorized, and simplified according to the research focus. The reduced data are then presented in the form of analytical narratives to facilitate the identification of patterns, communication dynamics, and forms of collaboration among actors within the Hexa-Helix model. The final stage involves drawing and verifying conclusions, which are carried out continuously throughout the research process to ensure the consistency and validity of the findings.

To ensure data validity, this study applies both source triangulation and methodological triangulation. Source triangulation is conducted by comparing information obtained from informants representing different stakeholder backgrounds within the Hexa-Helix model. Methodological triangulation involves comparing data collected through interviews, observations, and document analysis. Through these triangulation processes, the study is expected to produce

findings that are more valid, reliable, and comprehensive regarding the role of media in strengthening collaboration among stakeholders in geopark development.

This study analyzes the role of media in communication processes and collaboration among actors within the Hexa-Helix model in the development of UNESCO Global Geopark Kebumen. The analysis focuses on how media function in facilitating information flows, shaping narratives of sustainable development, and strengthening interactions among stakeholders involved in geopark management. These actors include government, academia, industry, community groups, media, and the broader public as part of the collaborative ecosystem. Thus, media are not merely positioned as channels of information dissemination, but also as strategic communication actors that play a role in building public legitimacy, strengthening collaborative networks, and encouraging community participation in geopark development.

Research informants were selected using purposive sampling by considering their level of involvement and knowledge regarding the development of UNESCO Global Geopark Kebumen. Informants represent various actors within the Hexa-Helix model, including government as policymakers and geopark managers, academia as knowledge producers and educators, industry actors as drivers of local economic development through geotourism, community groups as representatives of public participation and local identity reinforcement, media as actors of information dissemination and public opinion formation, and the public as information recipients as well as participants in geopark-related activities. The diversity of informants enables the study to capture a more holistic understanding of communication dynamics and collaboration among stakeholders in geopark development.

In analyzing the role of media in Hexa-Helix collaboration, this study refers to several key dimensions of strategic communication. First, information production, which emphasizes the role of media in delivering geopark-related information to the public. Second, issue framing, which concerns how media frame issues of conservation, geotourism, and sustainable development. Third, knowledge dissemination, which reflects the contribution of media in enhancing public literacy and understanding of geoparks. Fourth, communication networks, which describe the relationships and interactions between media and other actors such as government, academia, community groups, and industry. Fifth, public legitimacy, which highlights the role of media in building public support and trust toward geopark development. Through this analytical framework, the study seeks to comprehensively understand how media contribute to building a communication ecosystem that strengthens collaboration among actors within the Hexa-Helix model.

RESULTS AND DISCUSSION

Media as a Knowledge Broker in Geoscience Communication

This section explains the role of media as a knowledge broker in bridging geoscience knowledge with public understanding. Media not only disseminates information but also interprets and simplifies scientific knowledge through processes of knowledge co-production. However, challenges remain in balancing accessibility and scientific accuracy, making media a strategic actor in supporting Hexa-Helix collaboration and sustainable development.

The findings indicate that media plays a strategic role as a knowledge broker in bridging complex geoscience knowledge with broader and more heterogeneous public understanding. This role is not only reflected in the dissemination of information but also in the ability of media to interpret, simplify, and reconstruct scientific knowledge into more communicative and contextual narratives.

This finding is supported by media literacy analysis, which shows that various platforms—including mainstream media, local media, and official geopark channels—actively produce educational content related to geoparks. One concrete example is the educational program “Geopark Goes to School,” which is consistently reported and published as part of efforts to enhance geoscience literacy among students. This program functions not only as a means of socialization but also as a medium for translating geological knowledge into more applicable and easily understandable materials for younger generations.

Furthermore, based on data from national research institutions such as the National Research and Innovation Agency (BRIN), Kebumen Geopark possesses high geodiversity, including some of the oldest rock formations on the island of Java, as well as rich biodiversity and cultural heritage integrated within a single geopark landscape. This complexity requires communication strategies that are not only informative but also interpretative. In this context, media functions as an epistemic intermediary that translates scientific language into public language without losing its essential meaning.

Findings from interviews with informants from the Geopark Management Agency further support this result. One informant stated:

“Geological information is quite complex, and not everyone can easily understand it. This is where media plays an important role in simplifying it without losing its substance, so that people can better understand the value of the geopark.”

Meanwhile, an academic informant emphasized the strategic role of media in expanding knowledge dissemination:

“Geological research will not have a broad impact if it is not communicated properly. Media helps bridge research outputs so they can reach the wider public, especially through digital platforms.”

On the other hand, interviews with media practitioners reveal an awareness of this role, despite challenges in content production:

“We have to create content that is engaging but still accurate. The challenge is how to explain scientific concepts in a simple and appealing way for audiences.”

These findings indicate that media does not merely function as a one-way communication channel but also as an active actor involved in knowledge co-production. Within this framework, knowledge is no longer seen as a static product of academia, but as the result of interactions among various actors, including media, which play a role in constructing the social meaning of knowledge (Norström, 2020)

However, this study also identifies a potential reduction in meaning during the process of information simplification. Some media content tends to emphasize visual aspects and tourism

appeal rather than scientific depth. This reflects a tension between the need for public communication and scientific accuracy, as also identified in geoscience communication studies (Illingworth, 2018)

The role of media as a knowledge broker in the geopark context is not neutral, but active and constructive. Media does not merely transmit knowledge, but also shapes how that knowledge is understood, interpreted, and utilized by society. In the context of Hexa-Helix collaboration, this role becomes fundamental, as the success of geopark development largely depends on the ability of all actors to share a common understanding of the values and goals of sustainable development.

Media Framing and the Construction of Sustainability Discourse

The findings indicate that media plays a significant role in framing issues related to the development of UNESCO Global Geopark Kebumen. Media framing not only influences how information is delivered, but also determines how the reality of the geopark is constructed and perceived by the public. In this context, media functions as an active actor that shapes sustainability discourse through issue selection, emphasis on certain aspects, and the exclusion of others.

Analysis of media content reveals that the dominant framing is characterized by a positive narrative emphasizing geotourism potential, regional pride, and local economic opportunities. Many media reports position UNESCO recognition as a symbol of achievement and global legitimacy, reinforcing the image of Kebumen Geopark as a leading destination. This narrative is further strengthened by coverage highlighting geological uniqueness, landscape beauty, and community-based economic development potential.

This finding is supported by interviews with local government informants, who stated:

“Media plays a crucial role in building a positive image of the geopark. Through extensive coverage, people become more proud and begin to see the geopark as an economic opportunity.”

Meanwhile, informants from the tourism industry emphasized the direct impact of media framing on visitor numbers:

“After extensive media coverage, especially following UNESCO recognition, visitor numbers increased. Media has a strong influence in attracting tourists.”

However, the study also finds that the dominance of promotional framing limits the space for critical narratives. Issues such as conservation challenges, infrastructure limitations, and potential conflicts of interest among stakeholders are relatively underrepresented in media coverage. This indicates a tendency for media to prioritize popularity and attractiveness over analytical depth.

An academic informant critically noted:

“Media tends to focus only on the attractive aspects, such as tourism and scenic beauty, whereas important issues like conservation also need to be addressed more seriously.”

These findings align with framing theory proposed by (Entman, 1993), which suggests that media not only reflects reality but also actively constructs it through processes of selection and

emphasis. In the context of environmental communication, media framing has significant implications for how the public understands sustainability issues (Hansen, 2018).

Furthermore, in the digital era, media framing is increasingly influenced by algorithms and platform logics. Content that is visually appealing, engaging, and easily consumable tends to be prioritized over more analytical content. As a result, geopark narratives are more frequently constructed as tourism destinations rather than as science-based conservation areas.

Interviews with media practitioners confirm this phenomenon:

“Highly scientific content is usually less appealing. So we have to adapt to the audience, while still trying to maintain accuracy.”

Media framing in the geopark context presents a dual dynamic. On the one hand, positive framing enhances the visibility and attractiveness of the geopark and encourages public participation. On the other hand, the dominance of promotional narratives risks obscuring the complexity of sustainability issues, which are central to the geopark concept.

Within the framework of Hexa-Helix collaboration, media framing plays a highly strategic role, as it influences the perceptions of all involved actors. A balanced framing approach integrating promotion, education, and critical reflection is essential for building a more comprehensive collective understanding of sustainable geopark development.

Strengthening Communication Networks in Hexa-Helix Collaboration

Media plays a strategic role in building and strengthening communication networks among actors within the Hexa-Helix model in the development of UNESCO Global Geopark Kebumen. Media does not merely function as a channel for information dissemination, but also as a connector that links various actors with different interests and capacities, including government, academia, industry, communities, and the broader public.

The analysis of communication practices shows that the presence of media, particularly digital media and social media, has expanded the scope of interaction among stakeholders. Information regarding geopark programs, conservation activities, and tourism events can be rapidly disseminated and accessed by various actors. This creates a more open and dynamic communication space, where interactions are no longer one-way but evolve into two-way and even multi-directional communication.

This finding is reinforced by interviews with informants from the geopark management, who stated:

“Media greatly helps in connecting various parties. Information about geopark activities can be immediately accessed by communities, local groups, and even tourists from outside the region.”

Furthermore, informants from local communities emphasized that media provides space for public participation:

“We often learn about geopark activities from social media. From there, we can get involved, either as participants or as initiators of local activities.”

On the other hand, academic informants highlighted the importance of media in strengthening knowledge networks:

“Media opens up opportunities for collaboration between academics and society. Research findings can be more easily disseminated and utilized.”

However, this study also finds that the integration of communication networks has not been fully optimal. Interactions between media and grassroots communities remain limited and tend to be sporadic. Some local communities still lack adequate access to media or have not been fully involved in the production of communication content.

This issue is reflected in the statement of a community informant:

“Not all of our activities are covered by the media. Sometimes only major events are reported, while smaller community activities receive less attention.”

These findings indicate a gap in the distribution of communication, where media tends to focus more on actors with greater access and visibility, such as government institutions and large-scale events. This condition has the potential to hinder the realization of inclusive communication within the Hexa-Helix model.

From the perspective of collaborative governance, effective communication networks are a fundamental prerequisite for building trust, coordination, and cooperation among actors (Ansell & Gash, 2007)

In this context, media can be understood as a communication infrastructure that enables the exchange of information and the formation of social relationships among stakeholders.

Moreover, in the digital context, media also creates what is referred to as a *networked communication environment*, where the boundaries between information producers and consumers become increasingly blurred. Society is no longer merely a passive recipient of information but also acts as a producer of content (*user-generated content*), thereby enriching the geopark communication ecosystem.

However, to achieve a truly collaborative communication network, more participatory and inclusive communication strategies are required. Media should not only function as a disseminator of information but also as a facilitator of dialogue capable of accommodating voices from various actors, including groups that have been underrepresented. The role of media in the Hexa-Helix communication network is not only technical but also structural and cultural. Media contributes to shaping patterns of relationships among actors while also determining the extent to which collaboration can be carried out effectively and sustainably.

Media and the Construction of Public Legitimacy in Geopark Development

The findings indicate that media plays a highly significant role in building and strengthening public legitimacy in the development of UNESCO Global Geopark Kebumen. In this context, public legitimacy is not only understood as public acceptance of policies or programs, but also as a form of collective trust in the values, goals, and direction of geopark development.

Analysis of media coverage shows that UNESCO recognition of Kebumen Geopark serves as an important momentum in the construction of public legitimacy. Media intensively frames this recognition as a symbol of regional achievement and international acknowledgment, thereby reinforcing collective pride within the community. This narrative contributes to shaping the perception of the geopark as a strategic asset that must be supported and preserved collectively.

This finding is supported by interviews with informants from the local government, who stated:

“After the UNESCO designation, media coverage became very extensive. This has increased public trust in geopark programs.”

In addition, informants from local communities revealed that media influences how they perceive the geopark:

“We used to see it as just an ordinary tourist destination, but after frequent media coverage, we now understand that it is an important heritage that must be preserved.”

These findings indicate that media not only disseminates information but also plays a role in shaping collective awareness and social identity related to the geopark. From an environmental communication perspective, media functions as a discursive arena where legitimacy is constructed through representation, narrative, and social interaction (Cox, 2013)

However, this study also finds that legitimacy built through media tends to be symbolic if it is not accompanied by substantive public participation. In some cases, people are aware of geopark information through media but are not fully involved in decision-making processes or in the management of the area.

A community informant stated:

“We often see news about the geopark, but not all community members are directly involved in its programs.”

This finding indicates a gap between *communicative legitimacy* and *participatory legitimacy*. Media has succeeded in building symbolic support, but has not fully encouraged active public engagement in practice. Furthermore, the study identifies that the quality of legitimacy is highly dependent on media credibility. Accurate, balanced, and evidence-based information tends to increase public trust, whereas overly promotional or less critical content may lead to skepticism.

An academic informant emphasized:

“Legitimacy is not only about how often something is reported, but also about the quality of the information. Media must remain critical to maintain public trust.”

These findings align with (Dryzek, 2013), who argues that legitimacy in environmental governance is constructed through rational, inclusive, and reflective discourse. Therefore, media holds responsibility not only as a disseminator of information but also as a guardian of the quality of public discourse.

Within the framework of Hexa-Helix collaboration, public legitimacy becomes a key factor in determining the success of collaboration. Strong public support will enhance the sustainability of geopark programs, whereas weak legitimacy may hinder policy implementation.

Therefore, media needs to develop communication approaches that are not only informative and promotional, but also participatory and reflective. Media must be able to open spaces for dialogue, accommodate diverse perspectives, and encourage active public engagement.

The role of media in building public legitimacy is multidimensional, encompassing informative, symbolic, and participatory functions. Within the communicative ecosystem framework, legitimacy is not only constructed through messages, but also through interactions that enable the public to become part of the communication process itself.

Communicative Ecosystem Model in Hexa-Helix Collaboration

Based on the overall research findings, this study proposes a conceptual model referred to as a *communicative ecosystem* within Hexa-Helix collaboration. This model positions communication mediated by media as the central element that connects, drives, and sustains interactions among actors in the development of UNESCO Global Geopark Kebumen.

Within this model, media is no longer positioned as a supporting actor or merely an information channel, but as a central node that integrates various elements within the collaborative system. Media plays a role in connecting government, academia, industry, communities, and society through processes of information production, distribution, and the dynamic negotiation of meaning.

The communicative ecosystem is formed through several key components. First, **information production**, where various actors contribute to generating knowledge, whether in the form of scientific data, policies, or local experiences. Media then processes and transforms this information into narratives that are more communicative and accessible to the broader public.

Second, **information dissemination and distribution**, facilitated by media, particularly through digital platforms. This process enables rapid and widespread information sharing, thereby enhancing the visibility of the geopark and expanding communication networks among stakeholders. In this context, digital media plays a crucial role in creating an open and interactive communication space.

Third, **public interaction and participation**, where society is not only a recipient of information but also an active participant in communication processes. Through social media and other digital platforms, the public can respond, share experiences, and contribute to shaping geopark narratives. This indicates a shift from one-way communication toward participatory communication.

Fourth, **meaning construction and legitimacy**, where media plays a role in shaping public perceptions of the geopark. Through framing and representation, media helps build a collective understanding of the geopark as a site of conservation, education, and sustainable economic development. This process contributes to the construction of social legitimacy, which is essential for the sustainability of geopark programs. Fifth, **strengthening collaborative networks**, where continuous communication fosters closer relationships among actors. Media functions as a connector that enables coordination, information exchange, and the development of trust among stakeholders.

Interview findings further reinforce this model. An informant from the geopark management stated:

“Without strong communication, collaboration among stakeholders would not be effective. Media acts as a bridge that connects all actors.”

Meanwhile, a community informant emphasized the importance of participatory space: “Social media allows us to get involved, express our opinions, and even promote local potential.”

This communicative ecosystem model demonstrates that the success of Hexa-Helix collaboration is not solely determined by institutional structures, but also by the quality of communication established among actors. Communication becomes the foundation that enables coordination, integration, and the sustainability of collaboration.

Theoretically, this model extends the Hexa-Helix concept by incorporating communication as a key dimension within collaborative governance. While the traditional Hexa-Helix model emphasizes interactions among actors, this study shows that such interactions cannot be separated from communication processes that shape and direct collaborative dynamics. Thus, the concept of a communicative ecosystem provides a new perspective on sustainable development, where communication is not merely a tool, but a system that integrates knowledge, actors, and social action.

Discussion

Media as a Strategic Actor in Hexa-Helix Collaboration

The findings indicate that media can no longer be understood merely as a communication channel within the Hexa-Helix model, but rather as a strategic actor that plays an active role in shaping the dynamics of collaboration. This finding expands the conventional understanding of the Hexa-Helix model, which has traditionally positioned media as a supporting element rather than a primary actor.

In the context of the development of UNESCO Global Geopark Kebumen, media functions as a connector among actors as well as an agent of meaning construction. This role is reflected in its ability to translate geoscience knowledge, frame sustainability issues, and strengthen relationships among stakeholders. Thus, media does not only facilitate communication but also determines the direction and quality of interactions within the collaborative system.

These findings align with the perspective of collaborative governance, which emphasizes that the success of collaboration is largely determined by the quality of communication among actors (Ansell & Gash, 2007). However, this study goes further by demonstrating that communication is not neutral, but is mediated and shaped by media as an actor with its own interests, production logic, and audience orientation.

Knowledge Translation and Knowledge Co-Production

One of the main contributions of this study is the identification of media’s role in the process of knowledge co-production, where knowledge is not only produced by academics but also reconstructed through interactions with media and society.

In the context of geoparks, complex geoscience knowledge cannot be directly accessed by the public without a process of translation. Media assumes the role of a knowledge broker by simplifying scientific language into more communicative narratives. However, this process also

involves selection and interpretation, which may potentially alter the original meaning of the knowledge.

These findings support the argument of (Norström, 2020) that knowledge production in sustainability contexts is collaborative and involves multiple actors. In this regard, media becomes an integral part of the knowledge production process, rather than merely a distributor.

Nevertheless, the study also identifies a tension between scientific accuracy and the demands of public communication. Media tends to adapt content to audience preferences, which may lead to excessive simplification. This highlights that knowledge co-production does not always result in a complete representation of knowledge, but is influenced by social and economic dynamics within the media.

Media Framing and the Dominance of Promotional Narratives

The analysis shows that media framing in the geopark context is dominated by promotional narratives emphasizing tourism and economic aspects. This reinforces findings in environmental communication studies that media often prioritizes visually and emotionally appealing content over critical perspectives (Hansen, 2018).

Within the framework of framing theory (Entman, 1993), media not only conveys information but also determines which aspects are considered important by the public. By highlighting positive narratives, media contributes to constructing the image of the geopark as a leading tourist destination. However, this also has the potential to reduce attention to issues of conservation and sustainability.

The dominance of promotional framing reflects the influence of digital media logic, where engaging and easily consumable content is prioritized. Thus, media framing is shaped not only by editorial interests but also by algorithms and platform dynamics. These findings suggest that while media has the power to shape public agendas (*agenda-setting*), it also has limitations in presenting balanced discourse. Therefore, communication strategies are needed that integrate promotional narratives with critical education.

Communication Networks and Inclusivity Challenges

Digital media enables more open and participatory communication, thereby expanding the interaction space among government, academia, industry, communities, and society. However, the study also reveals inequalities in communication distribution. Not all actors have equal access and visibility in media, resulting in limited inclusivity in public participation. From a *networked communication* perspective, this indicates that although communication networks have been established, power structures in information distribution still influence which actors have more dominant voices.

Media tends to highlight actors with greater access to resources and formal legitimacy. This finding emphasizes that communication within collaboration is not only technical but also political. Therefore, strengthening communication networks must be accompanied by efforts to enhance inclusivity and representation of underrepresented groups.

In addition, media plays an important role in building public legitimacy for the geopark. Through consistent coverage, media shapes the perception that the geopark is a strategic asset with

ecological, economic, and cultural value. However, legitimacy constructed through media tends to remain symbolic if it is not accompanied by actual public participation.

This reflects a distinction between communicative legitimacy and practice-based legitimacy. From (Dryzek, 2013) perspective, legitimacy in environmental governance is built through inclusive and reflective discourse. Therefore, media plays a dual role not only as a disseminator of information but also as a space for public discourse.

These findings confirm that legitimacy depends not only on the frequency of media coverage but also on the quality of communication that fosters critical understanding and active public participation.

CONCLUSION

This study demonstrates that media plays a strategic and active role in Hexa-Helix collaboration for the development of UNESCO Global Geopark Kebumen, functioning not merely as a communication channel but as a knowledge broker that shapes collaboration through the production, interpretation, and dissemination of geoscientific knowledge. By translating complex science into accessible public narratives through knowledge co-production, media enhances visibility and engagement, although it also risks oversimplifying scientific content. Media framing tends to emphasize tourism potential and local identity, which strengthens promotion but may marginalize critical issues such as conservation and sustainability. While media expands communication networks and helps build public trust, challenges remain in ensuring inclusivity and transforming symbolic legitimacy into meaningful public participation. The study contributes theoretically by integrating environmental communication and collaborative governance perspectives within the Hexa-Helix model and proposing the concept of a communicative ecosystem, while practically recommending more participatory, inclusive, and science-based communication strategies. Future research should explore how different media platforms and digital ecosystems influence public engagement and participation, particularly in balancing promotional narratives with critical and sustainability-oriented discourse in geopark management.

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