



Baron Technopark as a Model for Sustainable Smart Educational Tourism Using the Penta Helix Collaboration Framework

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ABSTRACT

Baron Technopark is known as an educational tourism area with the specialty of renewable energy. This makes Baron Technopark a strategic area as a sustainable educational tourism. The study focuses on the role of penta helix actors in the development of the Baron Technopark educational tourism area. The purpose of this study is to determine and analyze the development of sustainable smart educational tourism in Baron Technopark. The type of research that the researcher will conduct uses a qualitative research method using the penta helix approach. The data collection process was carried out by interviewing five penta helix actors involved. The results of the study showed that the coordination of the role of penta helix actors in the development of sustainable smart tourism villages in the Baron Technopark area has not gone well. This is evidenced by the absence of managed management in Baron Techno Park. This is because the development in the Baron area does not yet have full legality from the local government in Yogyakarta. The coordination and collaboration that has been built between the government, business actors, communities, media and academics must be developed further.

INTRODUCTION

Fiske, J. (1990) "Communication is social interaction through messages." This statement encompasses both interpersonal and mediated communication. Unlike traditional models that treat communication as a one-way transmission of information, Fiske emphasizes that communication is a dynamic, interactive process in which meaning is created and shared. This perspective recognizes the role of context, interpretation, and social relationships in shaping how messages are understood.

The growth of the communication sector, in line with technological advancements, has had a significant impact on the tourism industry. Tourism communication is a tangible manifestation of this development, where communication plays a crucial role in marketing, accessibility, and destination management (Paramita, 2017). One of the emerging forms of tourism is educational tourism, where visitors not only travel but also engage in learning from the available resources.

Gunungkidul, as one of the tourism destinations in Yogyakarta, offers various natural, cultural, and educational tourism attractions that hold great potential for further development. Baron Technopark, as an educational tourism site focusing on renewable energy, is one such destination with significant potential but still requires an optimal development strategy.

This study aims to analyze the development strategy of educational tourism at Baron Technopark through the Penta Helix approach, which involves five key elements in sustainable tourism development: government, academia, business, community, and media (Ministry of Tourism Regulation No. 14 of 2016).

According to Law No. 10 of 2009 on Tourism, a tourism destination is a geographic area that has tourism attractions, facilities, accessibility, and an interrelated community. Educational tourism, as defined by Rodger (1998), is a program that allows tourists to gain direct learning experiences at tourism sites. Educational tourism can also serve as an optimal learning medium through the utilization of the environment and local resources.

The Penta Helix approach, introduced by the Minister of Tourism Arief Yahya, is a collaborative model involving government, academia, business, community, and media in sustainable tourism development. This approach aims to create synergy among stakeholders to develop tourism destinations that provide sustainable economic, social, and environmental benefits (Bungin, 2015).

To maintain focus and direction in this study, several limitations are established: The research focuses on Baron Technopark, located in Saptosari District, Gunungkidul, Yogyakarta. The study employs the Pentahelix approach to analyze the development strategy of Baron Technopark as a sustainable smart educational tourism destination.

Research Objectives

The objectives of this study are to analyze the implementation of the Pentahelix approach in the development of sustainable smart educational tourism at Baron Technopark, and to identify and examine the sectors that play the most significant role in supporting this development. This research is expected to provide academic contributions by offering new perspectives that enrich the field of communication studies, particularly through qualitative

analysis of collaboration in the development of educational tourism areas. Additionally, it aims to contribute to the advancement of Communication Science, especially in the context of tourism communication and new media and technology, by leveraging communication and technology as tools for learning.

LITERATURE REVIEW

Communication

Communication originates from the Latin word *communicatio*, which means notification or exchange. The term refers to an act in which a speaker expects a response from the listener, indicating the presence of active participation in the communication process. The word *communis*, meaning "together" or "common," forms the root of the word communication. In a modern context, communication can be defined as an effort to share information, ideas, or messages through dialogue and the exchange of symbols (Arifin, 2006:19–20; Mulyana, 2016:46).

Michael Burgoon states that communication is a deliberate process aimed at delivering messages to fulfill the communicator's needs. Communication involves not only verbal messages but also non-verbal cues such as facial expressions or tone of voice, which can provide additional meaning. Therefore, communication is an act that involves reciprocal influence between the sender and the receiver (Mulyana, 2016:68).

Elements of Communication

Communication consists of several key elements:

Sender (Communicator): The individual who has the need to communicate and transforms their thoughts or feelings into symbols that can be understood by the receiver.

- **Message:** The information that is being conveyed.
- **Medium:** The channel or tool used to deliver the message.
- **Receiver (Communicant):** The individual who receives the message.
- **Effect or Impact:** The influence or result of the communication on the receiver.

Functions of Communication

Communication serves several functions, including:

- **Fulfilling Physical Needs:** Communication plays an important role in enhancing an individual's physical health through social interaction.
- **Fulfilling Identity Needs:** Communication allows individuals to express and establish their identity in social interactions.
- **Fulfilling Social Needs:** Communication helps individuals meet social needs, such as building relationships and solving problems.
- **Fulfilling Practical Needs:** Communication facilitates the fulfillment of daily practical needs in everyday life (Kasali, 2005:15; Adler & Rodman, 2003).

Goals of Communication

Communication serves several functions, including:

- Changing Attitudes: Communication aims to influence the recipient's attitude.
- Changing Opinions: Communication seeks to achieve alignment or agreement in viewpoints or opinions.
- Changing Behavior: Communication is expected to influence the recipient's behavior in accordance with the message conveyed.
- Changing Society: Communication also aims to drive broader social change (Effendy, 2002:50–55).

Communication Barriers

According to Cangara (2013:37), communication barriers can be classified into several types:

- Technical Barriers: Occur when communication devices experience malfunction or damage.
- Semantic Barriers: Arise from the use of language that is not understood by the receiver.
- Psychological Barriers: Emerge due to psychological issues experienced by individuals.
- Physical and Organic Barriers: Caused by physical or geographical conditions that limit communication.
- Status Barriers: Happen due to social distance between the communicator and the communicant.
- Cognitive Frame Barriers: Occur because of differences in perception and experience between the communicator and the communicant.
- Cultural Barriers: Arise from differences in cultural values and norms between the parties involved in communication.
- Bureaucratic Barriers: Communication is hindered by an overly complex organizational structure.

Types of Tourism Communication

- Transportation Communication in Tourism: Provides accessibility information that is essential for the public.
- Visual Communication in Tourism: Utilizes creative visual concepts for tourism promotion.
- Group Communication in Tourism: Relies on communication skills in group-based tourism businesses.
- Online Communication in Tourism: Leverages online media for wide-reaching tourism marketing.
- Public Relations and MICE: The role of public relations in planning and executing MICE (Meetings, Incentives, Conventions, Exhibitions) events.
- Tourism Communication Research: Develops research focused on tourism communication-related topics.

Tourism

Muhamad (2021) defines tourism as all activities related to travel, including tourist attractions, tourism business operations, as well as tourism services and facilities such as travel agencies, accommodations, transportation, and restaurants. The tourism industry is a network of interrelated businesses that

provide goods and services to tourists, ranging from natural and cultural attractions to man-made tourism experiences.

Muhamad and Saryani (2021) state that tourism businesses encompass various aspects, including:

- Tourist Attractions: Management of natural, cultural, and artificial attractions.
- Tourism Areas: Management of designated tourism zones.
- Tourist Transportation Services: Provision of specialized transportation for tourism.
- Tourist Travel Services: Booking and planning of travel itineraries.
- Food and Beverage Services: Provision of dining services such as restaurants, cafés, catering services, and bars.
- Accommodation Services: Provision of lodging such as hotels and villas.
- Entertainment and Recreation Services: Organization of recreational activities such as performing arts and karaoke.
- Tourism Information Services: Provision of tourism-related information.
- Tour Guide Services: Provision of professional guides for tourists.

Educational Tourism

According to Ritchie (2003), educational tourism is a tourism concept that focuses on learning and experience. Educational tourism aims to provide direct learning experiences at tourist sites. Forms of educational tourism can include ecotourism, heritage tourism, rural tourism, and student exchange programs.

Sustainable Smart Educational Tourism

Sustainable development in tourism involves the optimal utilization of natural and human resources to maintain economic, social, and environmental balance. The concept of smart tourism integrates information and communication technology (ICT) with the goal of enhancing the tourist experience and destination management. Its main objectives are to improve tourism services, resource management, and the quality of service at tourism destinations.

The smart destination development model encompasses various dimensions such as the economy, infrastructure, and environmental sustainability. The guidelines for managing smart destinations include developing new economic sectors, fostering innovation, and preserving environmental sustainability through the application of smart technologies.

A Technopark is an integrated area designed to improve community welfare through innovation and knowledge-based industrial competitiveness. In the context of globalization and the shift toward a knowledge-based economy, Technoparks play a crucial role in facilitating the flow of technology and knowledge. This article explores the concept of Technopark, innovation diffusion theory, and the application of the Pentahelix model in the development of Baron Technopark.

Definition and Function of Technopark

A Technopark, also known as a science and technology park, is an area that integrates various elements, including universities, companies, financial institutions, and government agencies. Its main goal is to create a conducive

environment for the development of technology and innovation. According to the International Association of Science Parks (IASP), Technoparks are professionally managed to promote a culture of innovation and competitiveness in knowledge-based industries.

Innovation Diffusion Theory

The innovation diffusion theory explains how new ideas and practices spread among individuals and groups. Rogers (1995) identified four main theories: the innovation decision process theory, the individual innovativeness theory, the adoption rate theory, and the perceived attributes theory. These theories help in understanding how innovations are accepted and applied within society.

Penta Helix Concept

The Penta Helix model involves five elements: government, academics, business actors, community, and mass media. Collaboration among these elements is essential for regional development, including in technology-based tourism sectors such as Baron Technopark. Role of the Penta Helix Concept :

- Government: Provides access, infrastructure, and policies that support regional development.
- Academia: Contributes through research and innovation that support technological advancement.
- Business Actors: Drive the local economy and offer technology-based products and services.
- Community: Plays a role in the planning, implementation, and monitoring of development.
- Mass Media: Promotes the area and disseminates information about products and services.

METHODOLOGY

“Methodology is the philosophical framework that guides the choice and use of methods, connecting them to the research questions and underlying assumptions of the study.” This refers to the worldview or research paradigm behind a study. It includes how the researcher sees reality (ontology) and how knowledge is acquired or constructed (epistemology). Examples: A positivist philosophy assumes that reality is objective and measurable, an interpretivist philosophy believes that reality is subjective and shaped by human experiences.

This study employs a qualitative method, defined by Bogdan and Taylor (1975) as a research procedure that produces descriptive data in the form of written or spoken words. This method collects data through interviews and observations using the Pentahelix analysis model. The model integrates knowledge, natural environmental systems, and various other aspects within an interdisciplinary framework to understand effective quality-based development management.

This study adopts the constructivist paradigm, which views social science as the systematic analysis of socially meaningful actions through direct observation of social actors as they create and maintain their social world (Hidayat, 2003). Constructivism perceives reality as a social construct and

inherently relative, where each individual interprets and acts based on their own conceptual categories.

Data collection techniques include:

- Interviews: Conducted directly using the Pentahelix method. This technique gathers information from various sectors, such as academia, the tourism office, business actors, communities, and media (Bungin, 2011).
- Observation: Systematic observation is carried out to collect data relevant to the research objectives (Bungin, 2011).
- Documentation: Data is collected from archives, records, photographs, and related documents from the field.

The techniques for testing data validity include:

- Credibility Test: Conducted through data triangulation to ensure the reliability of research findings by combining various methods and data sources (Sugiyono, 2013).
- Transferability Test: Presenting a detailed and systematic research report so that the results can be understood by readers.
- Dependability Test: Monitoring the entire research process by supervisors to ensure methodological consistency.
- Confirmability Test: Organizing research results that can be traced back to the research process to ensure the validity of the findings.

This qualitative data analysis aims to provide an in-depth understanding of the studied phenomenon and produce useful findings in the context of developing educational tourism at Baron Technopark.

RESEARCH RESULT

SWOT Analysis

1. Strengths

- Established by a competent government institution: Baron Technopark is managed by experts in the field of renewable energy technology, particularly electrolysis, which enables the development of energy innovations that can benefit coastal areas.
- Scenic landscape: Located near Baron Beach, visitors can enjoy breathtaking views of the Indian Ocean, especially from the iconic Sun Clock area.
- Center for R&D and renewable energy training: Baron Technopark functions as a hub for research and dissemination of new and renewable energy (NRE) technologies, enhancing its educational tourism value.
- Clean and lush tourist area: By preserving its natural environment, Baron Technopark offers a green and clean atmosphere that supports the concept of sustainable tourism.
- Abundant energy resources: The area has great potential for the development of natural energy sources such as wind, water, heat, and ocean waves.
- Energy self-sufficient area concept: The use of renewable energy technologies, such as wind and solar power, demonstrates the area's commitment to being a model of energy self-sufficiency.

- Giant sun clock: This sun clock is one of the area's unique and distinctive attractions, serving as both a tourist draw and an educational tool about traditional timekeeping.
2. Weaknesses
- Limited academic collaboration: Currently, only engineering faculty members are involved in developing Baron Technopark, with little collaboration from other academic disciplines.
 - Limited culinary tourism options: The area lacks permanent food offerings, which are only available during certain events, reducing its appeal to culinary tourists.
 - Underdeveloped promotion agency: A lack of human resources in promotion and graphic design leads to minimal promotional efforts on social media and other marketing channels.
 - Lack of collaboration with tourism authorities: The absence of optimal cooperation with local tourism offices hinders the development of the area.
 - Minimal collaboration with the private sector: Limited private sector involvement restricts resources for developing educational tourism facilities.
 - Underutilized information technology facilities: Information technology that facilitates visitor access to information has not been maximized in this area.
 - Narrow access roads: The single narrow access road to Baron Technopark reduces visitor comfort and accessibility.
 - High cost of technological facilities: Technological innovations in the area are relatively expensive, posing challenges for further development.
 - Numerous caves in the area: The presence of caves around Baron Technopark requires careful consideration in infrastructure development.
3. Opportunities
- Potential to become a leading sustainable smart educational tourism destination: Baron Technopark is frequently visited by students from kindergarten to university level, as well as researchers, making it a center for technological education.
 - Strategically located tourist area: The area is still under development and surrounded by various tourist attractions such as beaches and local culinary spots. There is significant potential to expand resources and management to make it a popular and beneficial educational tourism destination for both visitors and local communities.
 - Opportunity for development as natural, educational, and eco-tourism: With its beautiful and lush environment, Baron Technopark has the potential to become a major tourist attraction, offering meaningful educational experiences that contribute to the advancement of tourism in Indonesia.
 - Abundant natural resources paired with advanced renewable energy technologies: The electrolysis technology derived from natural resources presents opportunities to develop the area into a smart tourism zone.

4. Threats

- High technology costs may hinder the development of educational tourism: Limited budgets and the high costs of required technologies are significant obstacles to developing this tourism area.
- Lack of public awareness about the technology may result in misdirected development: Stakeholders involved in developing the area face challenges due to insufficient community outreach, leading to unmet human resource needs.
- Unresolved legal status may delay development: Legal authorization is fundamental to the establishment and credibility of a tourism area. The absence of clear legal status may delay the development of Baron Technopark.
- Unrealized collaboration could stagnate progress: Collaboration should already be in motion if the handover from BRIN to the Yogyakarta Regional Government were complete. The lack of progress in establishing this collaboration results in minimal changes and advancements at Baron Technopark.

The SWOT analysis indicates that Baron Technopark has strong assets in terms of natural resources, technology, and educational potential. However, weaknesses in collaboration, promotion, and infrastructure must be addressed. By leveraging opportunities and addressing these weaknesses, Baron Technopark has the potential to become a leading educational tourism destination in the future.

DISCUSSION

Smart Educational Tourism Development:

Baron Technopark was initially established as a technological research area and later opened to the public as an educational and technology-based tourism destination. One of its main attractions is the Sun Clock with a scenic ocean backdrop, along with various facilities that support the education of new technologies, particularly renewable energy.

Smart Economy Dimension:

One of the economic development strategies at Baron Technopark involves collaboration with Event Organizers (EOs), which assist in managing tourist visits, including logistics such as meals and visit schedules. This supports local entrepreneurship, especially in the culinary sector, during large events such as festivals and holidays. The promotion of the area is also supported by digital media platforms such as Instagram and Facebook.

Smart Tourist Dimension:

Smart tourists utilize technology to interact with destinations and enhance their overall experience. Baron Technopark facilitates educational visits on renewable energy, which are well received by both tourists and the local community.

Smart Resident Dimension:

Community involvement in managing Baron Technopark is crucial. The management provides training to local residents on tour guiding and renewable

energy knowledge. Additionally, staff productivity is considered good, although there are challenges in managing tourist visits efficiently.

Overall, the development of Baron Technopark as a smart tourism destination supports local economic growth, education, and technology, aligning with the goals of sustainable tourism.

Smart Sustainability Dimension:

Baron Technopark demonstrates significant potential as a model for sustainable tourism areas. According to informants, it is the only technopark that is energy self-sufficient, utilizing renewable energy sources such as wind and solar power for electricity needs. This strengthens the smart sustainability concept, as it is environmentally friendly and reduces dependency on external energy sources such as the national power grid (PLN). This unique characteristic sets Baron Technopark apart, especially in the Gunung Kidul area, where renewable energy-based tourism destinations are still rare.

Cooperation with travel agencies and support from the local government are also key factors. Government assistance in terms of permits, infrastructure, and accessibility has accelerated the development of the area. However, collaboration with various stakeholders must continue to expand and evolve to increase public awareness and improve the management of both tourism and renewable energy at Baron Technopark.

Smart Governance Dimension

The governance of Baron Technopark is currently in a transitional phase, as management is being transferred from the National Research and Innovation Agency (BRIN) to the Regional Government (Pemda) of Yogyakarta Special Region (DIY). This transition has caused some delays in managing the area; however, the potential remains high due to strong enthusiasm from both the community and tourists. Informants consider the transfer positive because the Pemda DIY has a better understanding of the local tourism potential, including the necessary policies, infrastructure, and training.

Additionally, tourism governance at Baron Technopark includes visitor services supported by media staff who provide guidance to tourists. Nevertheless, more structured governance development is needed to manage visits and train tour guides effectively. With good cooperation among various stakeholders such as local government, academics, business actors, and the local community, the governance of Baron Technopark is expected to become more mature and efficient.

Smart Mobility Dimension

Smart mobility is a key concern in the development of Baron Technopark. Based on observations and interviews, one of the main challenges faced is the narrow access roads, especially for large buses, which hinder tourist visits. Therefore, road infrastructure improvements are necessary to enhance accessibility to the area.

Smart mobility also includes adequate parking facilities and the use of information and communication technology (ICT) to provide accurate, real-time information to visitors. In this regard, the integration of digital technology with mobility infrastructure needs further development to make the area a truly efficient and environmentally friendly smart tourism destination.

Overall, the development of Baron Technopark as a smart tourism destination supports local economic growth, education, and technology, aligning with the goals of sustainable tourism.

CONCLUSIONS AND RECOMMENDATIONS

Baron Technopark has the potential to become a smart tourism destination based on renewable technology. Support from the pentahelix actors, fulfillment of smart village dimensions, and better infrastructure development are key to achieving smart tourism status. Overall, the development of Baron Technopark as a smart tourism destination supports local economic growth, education, and technology, aligning with the goals of sustainable tourism.

Recommendations :

- Development of Knowledge and Local Wisdom: Supporting research based on local wisdom to improve the quality of human resources.
- Improvement of Technology Systems and Services: Focusing on the development of technology-based infrastructure.
- Enhancement of Human Resource Quality: Continuous training to improve technological understanding.
- Penta Helix Collaboration: Synergy among academics, business actors, government, and the community for effective development.

By implementing these recommendations, Baron Technopark can grow into an innovative smart tourism area that positively impacts the local economy and the welfare of the surrounding community.

ADVANCED RESEARCH

This study focuses on the research object located in the Baron Techno Park area, Saptosari District, Gunung Kidul, Yogyakarta. The study uses the pentahelix approach to analyze strategies for the development of Baron Techno Park.

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