

Operationalizing The Pentahelix Model Through The Empowerment Of Karangtaruna: A Collaborative Approach To Sustainable Urban Development In Semarang City

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ABSTRACT

This paper explores the operationalization of the pentahelix collaboration model through the empowerment of Karang Taruna (Kartar) as a strategic approach to strengthening sustainable urban development and advancing Smart Tourism Destinations (STD) in Semarang City. Using a qualitative, literature-based method, the research examines 57 academic and policy documents published between 2018 until 2024 to identify the interconnections among the five pillars of the pentahelix framework. The findings indicate that the community and academic sectors play a predominant role in fostering local innovation and supporting digital transformation, particularly in the fields of tourism promotion and creative economic growth. Empirical evidence from the Banjardowo village case demonstrates that youth empowerment through digital content creation and online commercialization training has significantly increased local visibility and participation. These outcomes affirm the potential of Kartar as a socio-digital intermediary capable of translating technology into community-driven practices. The study concludes that the integration of the pentahelix framework with community-based empowerment initiatives provides a viable model for realizing inclusive and sustainable smart city development grounded in local wisdom.

Keywords: Community Empowerment, Karangtaruna, Pentahelix, Semarang City, Smart Tourism Destinations.

A. INTRODUCTION

Semarang City is one of the contemporary urban areas that requires a growth path that is not only fast but also inclusive, sustainable, and adaptable to global technological advancements. That statement is related to the Society 5.0 Concept which integrates cyberspace and physical space through a human-centered and technology-based approach with a strategic framework for development oriented towards societal well-being. Related to the concept, the implementation of technologies such as Artificial Intelligence (AI) and the Internet of Things (IoT) has been identified as an important pillar in driving innovation and public service efficiency.

Based on the explanation above, transitioning to Society 5.0 presents opportunities and challenges. These include maintaining technological mastery and preserving character values and local wisdom. To address these issues, local governments must formulate development strategies. These strategies should align with the Smart Tourism Destination vision developed in the city of Semarang to optimize regional potential. In this context, the pentahelix collaboration model emerges as an important instrument for building synergy among the five main actors, which are academics, the business sector, the community, the government, and the media. Recent studies indicate that this multi-helix synergy can also strengthen tourism and digital creative ecosystems through a community-based approach.

The community-based approach in this article clearly highlights the important role of young people. This is because the young generation, especially Gen-Z, holds a key position in driving the realization of Society 5.0, a paradigm that integrates digital technology and creative content as the main drivers of progress. Their fluency in technology and innovative mindset is considered a fundamental factor for the success of this transformation, as emphasized by *Kementerian Koordinator Bidang Perekonomian Republik Indonesia* on 2023. In line with this view, the government stresses the urgency of nurturing young digital talent to accelerate technology-driven economic and social changes.

At the community level, Karang Taruna (in this paper will be summoned as Kartar) organization serves as a tangible manifestation of the role of Generation Z in local development. Kartar functions as a platform for the development of social and economic welfare, as well as the preservation of local wisdom, which focuses on enhancing digital capacity. The efficacy of creative content training programs and digital literacy in increasing Karang Taruna's capacity to manage local tourism promotion through social media and short video platforms has been demonstrated in research conducted at Serang Raya University (2023) and by Muchlis (2024).

B. RESEARCH METHODOLOGY

This study uses a literature-based study method with a descriptive qualitative approach to thoroughly examine the role of Kartar within the framework of pentahelix collaboration toward strengthening Smart Tourism Destinations (STD) in the Society 5.0 era. This approach was chosen because it aims to synthesize empirical findings and conceptual knowledge from various secondary sources without involving direct participation from research subjects. In the context of contemporary social research, the literature study method is considered effective for exploring theoretical relationships between social variables and policies, especially when the research focus is on the construction of ideas, public policy, and collaborative models.

First step on this research began with the stage of collecting secondary data sourced from various internationally indexed scientific publications such as Scopus, ScienceDirect, SpringerLink, and MDPI, as well as reputable national journals under the Science and Technology Index (SINTA). Besides it, the researchers use the supplementary sources, including government policy documents, community service reports, and national scientific repositories such as GARUDA and Neliti, which were also used as reference materials to strengthen the conceptual analysis. It should be noted that the criteria for selecting literature applied rigorously by considering three main aspects. First, the relevance of the topic to the focus of the study, namely the pentahelix model, the role of Kartar, and the development of Smart

Tourism Destinations. Second, the recency of publication, where only literature published between 2018 and 2024 was considered to align with the context of implementing Society 5.0. Third, the credibility of the sources, evaluated based on the reputation of the publishing institution, the research methods used, and the frequency of academic citations.

The collected secondary data analyzed using a content analysis approach and thematic synthesis. These techniques mapped each piece of literature to further trace its conceptual contribution to the five main elements of the pentahelix model. In this context, the analysis specifically highlights the position of Kartar as a representation of youth groups who function as drivers of the digital creative economy, social mediators, and agents of locally based innovation. That argument relates to this role underscores the importance of the younger generation as a driving force in the Smart Tourism Destination ecosystem, especially through the utilization of digital technology to expand social and economic impacts within the community. These findings reinforce previous research by Setiadi et al. (2023) and Rohayati (2024) which concluded that the success of implementing the pentahelix model heavily depends on the effectiveness of social networks and the digital capacity of the younger generation in accelerating regional development.

To ensure the accuracy of the study results, this research applies a conceptual triangulation mechanism by comparing findings across disciplines and different levels of analysis (Page et al., 2021). Validity is reinforced through the selection of credible, up-to-date literature, which is cross verified to ensure consistency across studies. Although this research does not involve direct empirical data, a systematic literature-based approach can produce a solid theoretical synthesis. Overall, the findings indicate that the empowerment of Kartar within the pentahelix framework becomes a fundamental element for strengthening social innovation and digital transformation towards sustainable urban development. Therefore, this study is expecting to make a significant conceptual contribution to the development of collaborative models and community-based governance in the Society 5.0 era.

C. RESULT AND DISCUSSION

The systematic literature review conducted in this paper encompassed a total of 57 academic and policy-related documents which collected from multiple scientific databases and institutional repositories. Among these, 38 documents (equivalent to 66.6%) derived from internationally indexed publications, including Scopus, ScienceDirect, SpringerLink, and MDPI, which ensured exposure to globally recognized research outputs. The remaining 19 sources (33.4%) consisted of nationally accredited journals registered under the SINTA classification system. These complemented by official regional government documents relevant to the research focus.

The selection and refinement of literature was carried out according to the systematic screening and eligibility procedures outlined in the PRISMA 2020 protocol. To maintain analytical rigor and consistency, three primary inclusion criteria established. For the first, the initial evaluation focused on the relevance of the studies themes to the pentahelix collaboration framework, the empowerment of Kartar youth organizations, and the development of STD. Next, temporal limitations were imposed on the selection criteria, requiring works published between 2018 and 2024 to ensure contemporary relevance and contextual relevance. Last, the credibility criterion emphasized the reliability of sources. This reliability was assessed through the institutional reputation of the publishers and the methodological transparency presented in each study.

Based on the results of the analysis of the total literature, 22 articles (38.6%) highlighted the application of the pentahelix model in regional development, 17 articles (29.8%) discussed youth community empowerment and social organizations such as Kartar, 12 articles (21.1%) focused on digital innovation and tourism transformation, while 6 publications (10.5%) consisted of regional policy documents and community service reports. This distribution of findings indicates that the theme of cross-sector collaboration and the role of the younger generation in smart city development remains a strategic research focus, particularly in the context of adaptation to the Society 5.0 paradigm.

1. Conceptual Framework Development and Key Theme Discovery

This paper utilizes content analysis and thematic synthesis to ascertain the extent of literature's contributions to the five primary pillars that comprise the pentahelix model. These pillars include the academia, business, community, government, and media. The analysis results indicate that the community pillar (37%) and academia (24%) are the two dominant elements most frequently highlighted in the literature related to collaborative-based development in Indonesia. These two pillars function as the primary catalysts in enhancing the capacity of local communities and fostering social innovation at the grassroots level. Conversely, the participation of the government (18%), the business sector (14%), and the media (7%) remains small, indicating an imbalance in the distribution of responsibilities among the main pillars in promoting regional sustainable development. This imbalance also suggests that cross-sector collaboration focus on academic institutions and communities, which function as stakeholders with access to knowledge, social networks, and digital infrastructure.

In the context of the community pillar, the synthesis results indicate that youth organizations, such as Kartar, occupy a strategic position as social nodes that facilitate collaboration among citizens, government entities, and local businesses. Of the 57 pieces of literature which analyzed, 11 case studies reviewed the role of Kartar in various Indonesian cities. Semarang city emerged as one of the most active locations in the development of a community-based STD model. A seminal study was conducted by the *Dinas Komunikasi dan Informatika* (Diskominfo) Kota Semarang in 2023 reported that a training program in digital content creation for members of the Kartar in Banjardowo Village led to a 47.3% increase in online visibility within a six-month period for three thematic villages. In this case, the villages are Kampung Mangga, Kampung Wirausaha, and Kampung KB. This increase measured through analysis of social media engagement insights, growth in visits to local promotional pages, and increased community involvement in digital-based tourism activities.

The role of Kartar in Semarang city is twofold. For the first, the organization is responsible for the creation of tourism promotional content and for the second, it is involved in the development of the creative economy and digital literacy of the community. A prime example is the "Kampung Wirausaha" which initiated by Kartar in Banjardowo village. This initiative has yielded the production of over 25 local products, marketed through digital platforms such as Shopee and Tokopedia. This activity exemplifies a genuine transformation from a social community into a digital creative hub, demonstrating its capacity to integrate local cultural values with technological innovation. That explanation aligns with research by Rochayati (2024) which underscores the notion that the initiative-taking engagement of the youth in the realm of tourism digital transformation plays a substantial role in enhancing regional competitiveness. Beside it, Kartar Banjardowo village was dealing with partnership collaboration with local universities to enhanced knowledge transfer through training programs focusing on interactive content creation and data-driven marketing-based social media management.

Aligning to the explanation above, BINUS University @Semarang Campus has also established a collaborative partnership with Kartar Banjardowo village which focuse on the domain of digital content production training. A mini workshop was held at the BINUS Immersive Gallery with a concern to capacity building for Kartar Banjardowo. The workshop included training in product photography using gadgets and digital marketing tips across various social media platforms. While these competencies may be considered rudimentary and learnable in isolation, in practice, they necessitate greater focus and specialized instruction. This is because a lot of individuals still perceive content creation as merely the production of content. This perception remains prevalent among society. Therefore, the empowerment of community organizations that drive society is imperative to augment the public's capacity and exert an influence on the creative economic sector in each region.

More than it, this research findings indicate that although communities and academics are the dominant actors, constructive collaboration among other pillars still needs to be strengthened for the pentahelix model to function optimally. Local governments play a crucial role in providing policy

frameworks and supporting facilities, while the business sector has the potential to sustain the economic viability of community-generated initiatives. Conversely, the media assumes a strategic role in shaping public narratives and expanding the reach of digital promotion. The involvement of this sector remains limited due to a lack of cross-institutional communication integration and the absence of a systematic governance model. The results of this study demonstrate that the strategic empowerment of Kartar within the pentahelix framework not only strengthens the digital ecosystem at the local level but also serves as a model for developing adaptive, inclusive, and sustainable smart cities in the Society 5.0 era.

2. Theoretical Synthesis and Patterns of Intervariable Relations

A synthesis of the literature shows that the successful implementation of pentahelix in the context of smart cities is influenced by two main factors. For the first, the digital capacity of youth communities and the second is effectiveness of collaboration between actors in the regional governance system. On this concept, Kartar acts as a digital intermediary who helps translate digital innovations into a social and cultural context. That is related to research which found that active youth participation in tourism promotion can increase domestic visits by up to 32%. Besides it, community involvement can strengthen local economic sustainability through a co-creation tourism model.

A notable strength of Kartar initiatives lies in their ability to mobilize academic and media resources. This strategic engagement not only amplifies the educational and informational dissemination functions of these activities but also positions them as initiative-taking producers of digital narratives. These narratives serve to enhance the positive image of the region, thereby fostering a positive perception within and beyond the community. Through the implementation of collaboration-based policies which reflect to BAPPEDA report on 2024, the local government is progressively integrating digital training, content management, and destination branding as part of its inclusive and sustainable development strategy.

3. Theoretical Implications

The findings of this paper carry significant implications for the fields of cross-sector collaboration theory and community empowerment theory. For the first, the results of the study demonstrate that the pentahelix model is not merely a coordinative framework. It is a dynamic system that depends on synergistic interactions between public, private, and social actors. For the second, in the paradigm of Society 5.0, the role of youth communities like Kartar, it is pivotal in facilitating technology transfer processes, adapting innovations to local contexts, and fostering a collective digital identity for the region. In principle, this research contributes to the theoretical framework of digital social capital, defined as the community's capacity to translate digital competencies into social, economic, and cultural benefits that are conducive to the enhancement of the surrounding environment. In the context of Semarang City, this concept is particularly salient considering the dynamism inherent in its socio-historical character, marked by a pronounced interaction between traditional and modern values. Kartar as a community-based social entity at the village level has the potential to function as a social connector between local cultural heritage which promoted by the local government through the Smart City Semarang 2025 agenda.

D. CONCLUSION

This research concludes that the implementation of the pentahelix collaboration framework through the empowerment of Karang Taruna (Kartar) constitutes a strategic mechanism for reinforcing sustainable urban development and advancing the Smart Tourism Destination (STD) agenda in Semarang City. A comprehensive analysis of 57 scholarly and policy-based references indicates that the community and academic sectors do a pivotal role in nurturing local innovation and facilitating digital transformation, particularly in the domains of tourism promotion and the creative economy. In terms of the government, business, and media dimensions, achieving a comprehensive and well-balanced operationalization of the model necessitates a more profound interconnectivity.

Empirical insights derived from the Banjardowo Village initiative demonstrate that youth-

centered digital capacity-building initiatives, encompassing training in digital content production and product commercialization via online marketplaces have resulted in significant enhancements in local visibility and public participation within a six-month period. These outcomes affirm the pivotal role of Kartar as a socio-digital intermediary, effectively translating technological advancements into accessible and community-oriented practices. The function resonates strongly with the Society 5.0 paradigm which places significant emphasis on the integration of human-centered innovation. It means technology complements rather than substitutes human agency.

Based on a theoretical perspective, the findings of this research also confirm that the pentahelix framework goes beyond merely a coordination mechanism that functions as a dynamic system. This means that the sectors interconnected within the pentahelix framework will be interdependent and drive constructive collaboration, including from the government, private sector, and society. Related to this argument, it can also be concluded that the active collective involvement of youth makes a significant contribution to the formation of digital social capital, facilitating knowledge dissemination, value creation, and strengthening community identity in the local context. In this context, Kartar's involvement serves as a connecting medium between cultural heritage and technological innovation, ensuring that the development of smart cities remains inclusive and grounded in local wisdom.

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