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Collaboration for The Implementation of Ambon Smart City

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Abstract: This research examines collaboration in implementing of Ambon smart city through six main dimensions: Smart Governance, Smart Branding, Smart Economy, Smart Living, Smart Society, and Smart Environment. The results show a strong synergy between the government, private sector, and community in creating an inclusive, sustainable, and technology-based city. Smart Governance improves transparency, accountability, and responsiveness through innovations such as ASN applications, One Map One Data systems, and omnichannel services. Smart Branding highlights local identity through City of Music and Ambon Extravaganza initiatives, which strengthen cultural and tourism appeal. Smart Economy encourages the digitization of economic services through a warehouse receipt system, cashless transactions, and the Ambon Access application to support MSMEs. Smart Living focuses on improving the quality of life through transportation infrastructure, wastewater management, and the development of health facilities and housing, according to sustainability principles. Smart Society prioritizes human resource development and literacy through IT training programs, the SIPBOS application, and library promotion, creating a knowledge-based society. This finding is supported by previous theories and research, such as Sustainable Development Theory (Brundtland, 1987), Digital Economy Theory (Tapscott, 1996), and Collaborative Governance Theory (Ansell & Gash, 2008), which emphasize the importance of collaboration across sectors and technologies in supporting smart city development.

Keyword: Ambon City, Collaboration, Smart City, Sustainability, Technology.

INTRODUCTION

The smart city concept emerged as a response to the challenges faced by urban areas, such as population growth, rapid urbanisation, and increasing complexity of city governance. Smart cities aim to integrate information and communication technology (ICT) in city governance to improve the quality of life of urban residents. The initiative covers the key pillars of economy, society, environment, and governance, which are implemented through various technology-based solutions, such as smart transport systems, integrated public services, and data management to support more sustainable urban planning (MOCI, 2023; Zhao et al., 2022).

In Indonesia, the smart city concept has been implemented in various regions, including Ambon City, with the hope of increasing the attractiveness of the city as a tourist destination. This initiative is in line with the 'Ambon Kota Musik' programme, which aims to strengthen the city's identity and promote the creative economy (Disparbud Maluku, 2023). In addition, smart cities also encourage regional development that includes not only urban areas, but also district and provincial areas. This reflects a development approach based on integration, collaboration and innovation to create more livable areas and support community activities (Bappenas, 2023).

Smart city development requires a holistic approach that covers all aspects of development, such as economic, environmental, social and infrastructure. The main objective is to avoid partial solutions that often ignore the complexity of people's needs. Recent research shows that integrated city management through the smart city concept can improve operational efficiency and the quality of public services (Zhao et al., 2022). Collaboration between the government, the community and the private sector is the key to success in implementing smart cities that are inclusive and responsive to community needs (Supriyadi & Winarno, 2023). However, Ambon City faces significant gaps in the implementation of the smart city concept, especially in terms of collaboration between stakeholders including the government, community and private sector. In the smart governance dimension, there are problems in data integration between Regional Apparatus Organisations (OPDs), resulting in a lack of efficient access to digital services. In the smart branding dimension, challenges in understanding regulations and limited human resources hinder the promotion of the city's branding as a smart city, although the potential of Ambon's diaspora has not been optimally utilised.

In the smart economy dimension, the absence of a comprehensive economic monitoring system is an obstacle to the development of a competitive digital economy. Meanwhile, the smart living dimension shows the difficulty in achieving minimum service standards in the health sector, which has implications for people's welfare. In smart society, high unemployment and low digital literacy create the need for community strengthening programmes. Finally, in the smart environment dimension, weak environmental monitoring and management has the potential to hinder the implementation of sustainable environmental regulations. Previous research has examined the implementation of smart cities in general in Indonesia, but there is a lack of in-depth studies on the collaboration between the government, private sector, academia, and communities in Ambon City. In addition, there has not been much analysis on how local factors such as culture, human resource capacity and government structure affect the success of smart city implementation. This research aims to fill this gap by exploring the six main dimensions of smart city in Ambon City, as well as identifying barriers and opportunities for more optimal development.

METHOD

Research Approach. This research uses a qualitative approach to explore the social context and dynamics that influence collaboration in the implementation of Ambon smart city. This approach, as suggested by Creswell (2014), is effective for understanding complex phenomena in a particular context. Research Design; This research adopts a case study design, which aims to explore the processes, challenges and successes of collaboration in the implementation of Smart City in Ambon City. This design follows Stake's (1995) guidelines which emphasise the importance of understanding the context in depth.

Participants and Sample; Research participants included key stakeholders, namely the Ambon City government, Smart City service users, private sector technology providers, and academics. A purposive sampling method was used to select participants who are relevant and have significant experience related to the research topic (Etikan et al., 2016).

RESULTS AND DISCUSSION

This section contains data (in brief form), data analysis, and interpretation of the results. Results can be presented in tables or graphs to clarify the results verbally because sometimes the display of an illustration is more complete and informative than the display in narrative form.

Smart Government

Smart governance in Ambon City is an information and communication technology (ICT)-based governance transformation designed to improve efficiency, transparency and accountability. This approach is rooted in the idea of modern governance that is inclusive and data-driven, ensuring sustainability and responsiveness in meeting community needs. Some of the key programmes implemented are:

a. ASN application to monitor employee performance and determine Employee Income Allowance (TPP) in a data-driven manner, in line with Armstrong and Baron's (2005) theory on data-driven performance management.
b. ASN application to monitor employee performance and determine Employee Income Allowance (TPP) in a data-driven manner, in line with Armstrong and Baron's (2005) theory on data-driven performance management.

Collaboration across sectors is a central element, as per Ansell and Gash's (2008) theory of collaborative governance, where synergies between stakeholders such as the private sector through CSR support the development of digital infrastructure. Technologies such as the Command Centre support real-time monitoring and response, in line with Sørensen and Triantafillou's (2013) view of the importance of digital systems for responsiveness and efficiency. Despite challenges such as limited resources and community awareness, local culture-based initiatives, such as strengthening the identity of the 'City of Music,' demonstrate Ambon City's commitment to inclusive governance and sustainability. This approach is supported by Kavaratzis' (2005) theory of place branding, which emphasises the importance of local identity in building city attractiveness. Through the integration of technology, community participation, and cultural approaches, smart governance in Ambon not only supports better governance but also lays the foundation for a resilient, inclusive, and sustainable city.

In his interview, the Head of the Infocomm Office of Ambon City, Mr Ronald Lekransy, underlined that the success of smart governance depends not only on technology, but also on the involvement of all stakeholders. According to him, initiatives such as the ASN application and live chat feature reflect the government's efforts to create a more open, inclusive, and needs-based governance system. However, he also emphasised that collaboration is the key element that makes all these programmes possible. This collaboration not only includes the private sector through CSR, but also involves the community in maintaining public facilities and actively participating in decision-making. This collaboration process also involves institutional design that supports the realisation of cross-sector synergies. Ambon City has developed an integrated management information system to ensure that population data can be used as the basis for every public service. This system enables faster, more accurate and transparent service processes. In addition, data transparency also helps improve government accountability, where the public can monitor budget utilisation and development results in real-time. Within this collaborative framework, the leadership of the Ambon City government plays an important role in ensuring the success of these programmes. Collaborative leadership that creates a space for dialogue between the government and the community.

Smart Branding

Smart branding is an important dimension in the implementation of Smart City in Ambon City, focusing on building a city image based on local culture, unique identity, and digital

technology innovation. Ambon's identity as the ‘City of Music’ is the main basis that directs the city's branding strategy. Tapscott's (1996) digital economy theory provides a framework that digital technology can create innovation, expand promotional reach, and increase added value in the context of city branding. The application of this theory in Ambon City is seen in various initiatives that utilise digital technology to introduce cultural and musical heritage to local and global audiences. Digitalisation has become a key tool in supporting the promotion of Ambon's culture and tourism. Through social media, websites and online applications, information about music festivals such as Sound of Spice and other thematic concerts can be disseminated quickly. The Head of Ambon City's Communication and Informatics Office, Mr Ronald Lekransy, emphasised that digital technology provides an opportunity to reach a global audience while strengthening local people's pride in their culture. This is in line with Tapscott's view that the utilisation of digital technology in city branding can create a strong emotional connection between the city and its people. The role of the Maluku diaspora is also an integral part of smart branding in Ambon City. The diaspora acts as ambassadors of the city's culture.

In addition to cultural promotion, digital technology is also being used to enhance the tourism experience in Ambon. Destinations such as the Horseshoe and Salobar Water have been equipped with smart lighting and other digital features to strengthen visual appeal. Ambon City's Command Centre also monitors tourist areas in real-time, ensures tourist safety, and provides relevant information. This step demonstrates how technology can integrate safety and convenience in the management of tourist destinations. Sørensen and Triantafillou (2013) note that this kind of technology utilisation increases the efficiency of city management and strengthens public trust in the government. Cross-sector collaboration is key to the success of smart branding in Ambon City. The Tourism and Culture Office, through the Ambon Music Office (AMO), manages various cultural and musical events to strengthen the city's identity as the ‘City of Music’. Meanwhile, the Education Office develops a music-based curriculum in schools to support the strengthening of cultural identity from an early age. The Department of Communication and Informatics (Kominfo) is responsible for building the digital infrastructure that supports these initiatives. Mr Lekransy emphasised that the success of this collaboration depends on the role of each Regional Apparatus Organisation (OPD) complementing each other to achieve a common vision.

Smart branding in Ambon City also includes a disaster mitigation dimension, utilizing technology to increase community resilience to risk. CCTV and monitoring technologies are used to monitor disaster-prone areas, provide real-time information, and support rapid response. Mees et al. (2019) mentioned that collaboration in disaster risk management can improve community adaptation and response capacity. This step shows that city branding includes not only the promotion of culture, but also the strengthening of systems that support the sustainability and safety of the city. However, the implementation of smart branding in Ambon is not without challenges. Limited infrastructure and human resources, especially in implementing a music-based curriculum, are obstacles that must be overcome. The government needs to invest in training and capacity building to ensure the sustainability of the program. In addition, the digital literacy of the community needs to be improved so that they can be more actively involved in the promotion and management of local potential. According to research by Michels and de Lange (2011), effective community participation depends on citizens' awareness and ability to contribute to the sustainability of government programs.

With a technology-driven approach, cross-sector collaboration, and a focus on local culture, smart branding in Ambon City has created a solid foundation to improve the city's competitiveness at the national and international level. Initiatives such as Sound of Spice, smart lighting in tourist destinations, and diaspora engagement demonstrate how Ambon is leveraging cultural identity and technology to create an inclusive, innovative, and competitive city. This supports the theory that successful city branding not only reflects a positive image,

but also creates a deep connection between the city and its community, as formulated by Kavaratzis (2005).

Smart Economy

Smart Economy is one of the main pillars in the transformation of Ambon City as a Smart City, focusing on the utilisation of digital technology to drive inclusive, efficient and sustainable economic growth. Referring to Tapscott's Digital Economy theory (1996), this transformation aims to create new value through digitalisation, better connectivity, and sustainable innovation. In Ambon City, the development of apps such as Kalesang Kintal Kosong and Jiku Bata show how technology is being used to empower MSMEs. These applications facilitate the marketing of local products, expand market access, and support local economic growth. Head of Ambon City's Infocomm Office, Ronald Lekransy, emphasised the importance of these apps in creating an inclusive digital ecosystem although challenges such as people's digital literacy still need to be addressed. The government also encourages civil servants to use the app for shopping as a form of support for MSMEs. Transformation towards a less-cash economy is also a priority, where the government is working with Bank Maluku and BNI to provide QR code-based digital payment facilities in markets and public services. According to Lekransy, this effort not only improves transaction efficiency but also supports transparency. However, public acceptance of this technology still needs to be improved through education and socialisation. Tapscott's research confirms that the success of transforming

Another strategic programme is Ambon Access, a digital platform that integrates public services such as tax and levy payments. The app is designed to make it easier for the public to access government services and improve transparency. However, challenges in coordination across sectors and technology vendors are obstacles that need to be overcome. Pardo et al. (2011) emphasise that the success of public digital services relies heavily on system integration and responsiveness to user needs. In environmental management, Ambon City has also adopted a circular economy approach through a technology-based waste management programme. Collaboration between the Environmental Agency and the Industry and Trade Agency resulted in a plastic bag restriction policy in modern outlets and 3R (Reduce, Reuse, Recycle) efforts to create economic value from waste. The Head of the Environmental Agency stated that changing people's behaviour is the main challenge, but intensive education measures are expected to accelerate the implementation of this policy. Cocchia (2014) highlighted that the success of Smart City requires a strong integration of technology with active community involvement.

The Warehouse Receipt System (SRG), managed by the Industry and Trade Office, is another example of innovation in the smart economy. The programme allows farmers and fishermen to store their produce in certified warehouses and use the receipts as collateral for financing. SRG supports price stability and easier access to financing, strengthening the local economy. However, challenges remain, including low digital literacy and community resistance to technological change. Public education and participatory approaches are key to increasing public acceptance of digital transformation. Michels and de Lange (2011) point out that effective community participation in digital economy initiatives requires high awareness and support from citizens. Through strategic programmes such as Kalesang Kintal Kosong, cashless transactions in the market, and the Warehouse Receipt System, Ambon City shows great potential in realising a smart economy. With strong cross-sector collaboration and a focus on local empowerment, Ambon is not only creating an inclusive digital economy ecosystem but also strengthening its competitiveness as a modern economic centre in Eastern Indonesia. The combination of technological innovation with local community empowerment provides an opportunity to create sustainable economic growth, while serving as a model for other cities looking to adopt a similar approach.

Smart Living

The implementation of Smart Living in Ambon City is an important part of the transformation towards a Smart City that focuses on improving the quality of life of the community by integrating digital technology, environmental management, and the provision of inclusive public services. This approach is based on Brundtland's (1987) Sustainable Development theory, which emphasises meeting the needs of the present without compromising future generations, and Putnam's (1995) Social Capital theory, which underlines the importance of social networks and trust in supporting collaboration. One important aspect of Smart Living is the development of environmentally friendly and efficient modes of transport. This transport system is designed to increase community mobility while reducing carbon emissions, in accordance with the principle of sustainability. The Ambon City Government through the PELAYAN ULI programme managed by the Transportation Agency is targeting to increase the number of roadworthy vehicles to 5,000 units. The vehicles are designed to meet safe technical and environmental standards, providing convenient and affordable transport access for the community. Ronald Lekransy, Head of the Infocomm Agency of Ambon City, emphasised the importance of involving the community in transport planning to ensure the service is relevant and supports their mobility effectively.

In the health aspect, the utilisation of information technology is a key component. Ambon City has developed health applications to monitor diseases such as HIV/AIDS and tuberculosis, giving the government the ability to intervene early and effectively. However, low digital literacy is a major obstacle in maximising the benefits of these applications. Ronald Lekransy highlighted the importance of intensive socialisation so that people understand the benefits of the app and use it optimally. Telemedicine technology is also being applied to improve access to health services for people in remote areas, enabling equitable distribution of health services and reducing access gaps. Spatial data-based spatial management is another focus of Smart Living in Ambon City. Spatial data helps the government plan an optimal city layout, including the development of green spaces, social infrastructure, and efficient land management. This initiative supports the creation of an environmentally friendly and sustainable city, ensuring people's needs for housing, transport, and public spaces can be met. In environmental management, the Wastewater Handling in Slum Areas programme, a collaboration between the PUPR Agency and the Environment Agency, aims to reduce pollution and improve the quality of life for people in the area. This implementation reflects the circular economy principle that supports sustainability through waste management.

In the education and disaster mitigation sector, BPBD's Disaster Safe Schools programme is designed to improve student and teacher preparedness for disaster risks. The programme includes strengthening school infrastructure to be disaster-resistant, evacuation training and education on risk mitigation. This not only creates a safe educational environment but also increases community awareness on the importance of disaster preparedness. Providing housing for low-income people is one of the main programmes in Smart Living. The Ambon City Government through the Housing and Settlement Areas Office prioritises the construction of livable houses for low-income communities. The programme aims to reduce slums and improve people's access to decent housing, supporting their social and economic stability. This effort demonstrates the government's commitment to creating a more inclusive and equitable neighbourhood.

Inter-regional organisation (OPD) collaboration plays an important role in the success of Smart Living. This approach reflects a joint effort that integrates infrastructure development, environmental management, and public services with digital technology to create a livable city. An interview with the Head of Infocom confirmed that this collaboration reflects a holistic vision in supporting Ambon City's transformation towards a sustainable Smart City. However, challenges such as low digital literacy and lack of socialisation of digital applications to the

community show that public education and participatory approaches are still an urgent need. Overall, Smart Living in Ambon City demonstrates how digital technology, environmental sustainability, and cross-sector collaboration can work together to improve people's quality of life. With clear indicators of success and strategic programmes, Ambon is not only working towards creating a more livable city but also building the foundation for future generations to enjoy a more sustainable and inclusive environment.

Smart Society

The implementation of Smart Society in Ambon City is a form of collaboration between various stakeholders to build an inclusive, empowered and technology-based society. Ansell and Gash's (2008) Collaborative Governance Theory and Tapscott's (1996) Digital Economy Theory serve as conceptual foundations that strengthen this approach. According to Ansell and Gash, the active involvement of the government, private sector, and community is a key element of success. In Ambon, this collaboration is seen in various education, security and community empowerment programmes aimed at creating strong social connectivity and equitable access. One strategic step is the utilisation of information technology in education. The Ambon City Government, through the Education Office and the Communication and Information Office, has developed the Out of School Mobile Application to support flexible learning for more than 58,000 students. The app provides access to learning materials and online evaluation, reaching students in remote areas while reducing the education gap. This move is in line with Tapscott's view on the importance of technology as the foundation of a knowledge-based society. In addition, IT training for educators helps to strengthen the integration of technology in the learning process, ensuring the relevance and quality of education in the digital age.

In terms of security, the collaboration between the government, authorities and the community creates an effective community-based security system. Community participation in incident reporting and neighbourhood watch increases the sense of security while building trust between citizens and security forces. These efforts are supported by digital technology that facilitates better communication and coordination. The success of Smart Society is also evident in the promotion of local culture through programmes such as the Anak Bangsa Music Festival, which involves all primary and secondary schools in Ambon. This programme not only encourages children's creativity through the arts but also strengthens local cultural identity, creating pride and social cohesion. According to the Head of Ambon City's Infocomm Office, Ronald Lekransy, this culture-based programme is one way of building a cohesive society while utilising technology as a means of promotion and talent development.

Public literacy is a major concern in the implementation of Smart Society. Through the Promotion of Libraries in Public Spaces, the government seeks to expand public access to reading materials and information. This programme creates a stronger culture of literacy, supporting the formation of a smart and empowered society. However, digital literacy challenges still hamper the optimisation of technology, as Ronald Lekransy explained in an interview. Many people do not fully understand the benefits or how to use government-provided applications, pointing to the need for more intensive public education.

Smart Environment

The implementation of Smart Environment in Ambon City is a strategic step in an effort to build a sustainable, healthy and environmentally friendly urban environment. This approach is rooted in the Sustainable Development Theory formulated by Brundtland (1987), which emphasises the importance of meeting the needs of the current generation without compromising the capabilities of future generations. In the context of Ambon City, the main focus of Smart Environment includes waste management, renewable energy utilisation, waste

management, green open space (RTH) development, and community involvement in protecting the environment. Waste management is one of the priorities through collaboration between the Environmental Agency and the Public Works Agency. The improved waste management infrastructure is equipped with technology such as real-time waste monitoring sensors, which enable more effective monitoring of the impact of waste on the ecosystem. Head of the Ambon City Environment Agency, Alfredo Jansen Hehamahua, emphasised that the success of the programme relies heavily on community participation in sorting organic and non-organic waste, which is part of a community-based waste management strategy. This approach is in line with the findings of UN Habitat (2013), which shows that modern technology must be supported by community education to increase the effectiveness of waste management.

The utilisation of renewable energy is another important element, with an initial focus on methane gas development in landfills. Although this project was delayed by the 2019 earthquake and the COVID-19 pandemic, the government remains committed to continuing its implementation. Long-term plans include developing solar energy by involving local communities in the installation and maintenance of infrastructure. According to the Head of the Environmental Agency, the use of methane gas can reduce greenhouse gas emissions while providing an environmentally friendly energy alternative. Research by Caragliu et al. (2011) supports that renewable energy requires cross-sector collaboration for successful implementation. Waste management in the border area of Ambon City and Central Maluku Regency requires cross-regional cooperation. The Ambon City government, together with local kings and village heads, developed a community-based waste management system, involving traditional leaders, religious leaders, and village officials. Alfredo Jansen Hehamahua highlights that this approach is not only effective in waste management, but also raises public awareness about the importance of protecting the environment. This approach is relevant to Putnam's Social Capital Theory (1995), which emphasises the importance of social networks in supporting community collaboration and participation.

Public awareness is key to the success of Smart Environment, which is supported by regulations such as the Regional Regulation (Perda) on waste management. Enforcement of these regulations is carried out by the Satuan Polisi Pamong Praja (Satpol PP), accompanied by public education on the importance of sorting waste, reducing plastic use, and utilising recycling facilities. According to an internal government survey, the level of environmental literacy in Ambon still needs to be improved to ensure the effectiveness of this programme. Interview results show that community engagement through traditional and religious leaders is an effective method in building collective awareness. Green open space (RTH) is one of the main programmes, designed to provide public spaces that support social interaction, recreation, and improved air quality. Collaboration between the Public Works Agency and the Environment Agency ensures effective spatial data-based spatial planning, enabling each region to have access to adequate green spaces. According to the Head of the Public Works Agency, the use of technology in spatial planning ensures that green spaces are designed in accordance with the needs of the community and environmental sustainability. Banister's (2008) research confirms that green spaces improve the balance of urban ecosystems and provide psychological benefits to the community.

While many steps have been taken, the main challenges remain limited infrastructure, resources, and low levels of environmental literacy. However, collaboration across Regional Apparatus Organisations (OPDs) and engagement with local communities provide a strong foundation to overcome these challenges. As emphasised by the research of Caragliu et al. (2011), the success of Smart Environment requires technology integration, inter-agency cooperation, and high public awareness. Ambon City, through its inclusive and sustainable approach, has great potential to become a model for successful Smart Environment implementation in Eastern Indonesia.

Collaboration across OPDs in the Smart Environment dimension in Ambon City shows strong synergy to achieve environmental sustainability goals. Each work program is supported by measurable success indicators that are relevant to the local context. The program is not only technology-oriented but also involves the community through education and regulation, creating a holistic approach to Smart City implementation. Previous research supports that the success of this initiative relies heavily on cross-sector collaboration, local community engagement, and the adoption of sustainability-based technologies.

CONCLUSION

This research reveals that collaboration in the implementation of Ambon smart city through six main dimensions - Smart Governance, Smart Branding, Smart Economy, Smart Living, Smart Society, and Smart Environment - shows the synergy between the government, private sector, and community in creating a more inclusive, sustainable, and technology-based city. Each dimension has a specific approach supported by key theories and relevance to previous research.

1. Smart Governance: This dimension utilizes technology to improve government transparency, accountability, and responsiveness to community needs. Initiatives such as ASN applications for performance monitoring, omnichannel features for public services, and One Map One Data systems demonstrate the importance of technology-based data to improve the effectiveness of city management. Underlying theories such as Sørensen & Triantafillou (2013) and Michels & de Lange (2011) support the use of technology in strengthening policy legitimacy and organizational effectiveness.
2. Smart Branding: Through programs such as Ambon Extravaganza and the City of Music initiative, this dimension highlights local culture as a key identity to enhance tourist attraction. Collaboration between the government and local communities creates innovations that strengthen the city's branding as a cultural and music center. This is in line with Tapscott's (1996) digital economy theory and Kavaratzis' (2005) findings that emphasize the importance of local identity in creating global competitiveness.
3. Smart Economy: This dimension emphasizes the digitization of economic services to improve efficiency, inclusiveness, and competitiveness. Programs such as the warehouse receipt system (SRG), cashless transactions at TPI, and the Ambon Access application support the growth of MSMEs and local economic management. Research by Tapscott (1996) and Cocchia (2014) confirms that cross-sector collaboration and the application of digital technology can create a sustainable economy.
4. Smart Living: This dimension focuses on improving people's quality of life through the development of transportation infrastructure, wastewater management, and the provision of health and housing facilities. Initiatives such as Disaster Safe Schools and the development of efficient modes of transportation demonstrate efforts to create a safe and comfortable environment. Sustainable development theory (Brundtland, 1987) and research by Mees et al. (2019) support the importance of sustainability and community engagement in creating livable cities.
5. Smart Society: Collaboration in human resource development and community literacy is at the core of this dimension. Programs such as IT training for educators, SIPBOS applications, and library promotion create an inclusive and knowledge-based society. Ansell and Gash's (2008) theory of collaborative governance and Tapscott's (1996) research emphasize the importance of technology and cross-sector collaboration in supporting education equity and community capacity building.
6. Smart Environment: This dimension integrates waste management, renewable energy development, and green open space (RTH) creation to create a sustainable environment. Collaborations across DPOs, such as circular economy-based waste management and

methane gas utilization, demonstrate the importance of an integrated approach in addressing environmental challenges. Sustainable development theory and research by Caragliu et al. (2011) support that environmental sustainability requires close cooperation between the government, community and private sector.

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