Bali Smart Island: Smart City Implementation in Bali Province

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Article Info

Abstract: This study aims to explore and examine SPBE Towards Bali Smart Island in the Provincial Government of Bali. This study used a qualitative descriptive research method with an inductive approach. Data collection was carried out through interviews, observation, and documentation techniques. The results showed that SPBE towards Bali Smart Island has been going well and has implemented smart city development. However, ASN's digital literacy and competence are still weak, post-pandemic regional budgets are not stable, cyberattacks, and the large number of application systems built by the center and each region are obstacles to implementing SPBE Towards Bali Smart Island. Strategies that can be implemented to overcome the obstacles encountered in implementing SPBE towards Bali Smart Island include: collaborating with pentahelix elements to hold local, national and global scale activities and events based on digital technology scale such as the Bali Digital Festival which is held every year; encouraging international investors to develop the digital technology industry in Bali so as to have a domino effect in developing smart city dimensions in realizing Bali Smart Island; forming an internal audit/assessor team to carry out periodic assessments related to SPBE development so as to create strong control and evaluation; optimizing the Cyber Lantern program using social media platforms in the form of providing training and sharing knowledge related to the use of digital technology, data security, technology ethics and so on as a medium for increasing digital literacy; forming the SPBE Forum throughout the Province of Bali to form integrated development of the Bali Smart Island program and hold training on the use of certified digital technology.

Keywords: SPBE; Smart City; Bali Smart Island

INTRODUCTION

The massive transformation of the digital world in Indonesia itself was initially marked by the issuance of Presidential Instruction Number 3 of 2003 concerning National Policy and Strategy for E-Government Development. The central and regional governments compete to make innovations and creations by utilizing digital technology to carry out government activities and provide public services to the community (Cendikia et al., 2020). The Bali Smart Island program is one of the Governor of Bali's programs as a form of policy to carry out digital transformation and build a smart city in Bali. Bali Smart Island implements the smart city concept, which is within the scope of the district/city area and covers all island-based areas in Bali. The Bali Smart Island program is one of the programs issued to realize the vision of *Bali Nangun Sat Kerthi Loka Bali*, building Balinese nature, society, and culture based on local wisdom *Tri Hita Karana* (Devotion to God, Humanism, and Environmental Preservation). With the jargon "One Island One Management," Bali Smart Island can be interpreted as an information technology-based government unit

integrated between the provincial and district/city governments in Bali (Pratama, 2021). In realizing Bali Smart Island, the Provincial Government of Bali has developed an Electronic-Based Government System (SPBE) under the mandate of Presidential Regulation Number 95 of 2018 concerning Electronic-Based Government Systems. The Bali Provincial Government's SPBE index has been in the low/less category for three consecutive years, from 2018 to 2020, with a stagnant value of 1.62 (Pemprov Bali, 2022). Meanwhile, in 2021 the Bali Provincial Government's SPBE index experienced a significant increase with a value of 3.68 in the very good category.

Various activity programs are carried out in realizing Bali Smart Island, such as providing free wifi services throughout Bali Island to rural areas and developing digital-based application systems to connect all services in an integrated manner. However, according to (Dewi & Prianthara, 2022), the SPBE in the Provincial Government of Bali still encounters various obstacles. One of the obstacles is that many State Civil Apparatuses (ASN) of the Provincial Government of Bali are still not yet literate in technology. This condition is also shown by the value of the digital literacy index for the Province of Bali in 2021, which ranked 28th out of 34 provinces in Indonesia (Dihni, 2022). In addition, according to research conducted (Muka et al., 2020), another problem encountered in implementing SPBE at the Provincial Government of Bali is that there are too many application systems that are owned, both those built by the respective Regional Apparatuses and by the central government. This issue often complicates the process of system integration and data integration resulting in ineffectiveness in service and government processes. In addition, the poor quality of human resources and IT infrastructure in each OPD is a challenge and obstacle in implementing SPBE in realizing Bali Smart Island.

Research by (Sari et al., 2019), entitled *Regional Readiness Towards West Java Smart Province*, examined the implementation of the West Java Smart Province (JSP) to obtain a comprehensive picture from the administration side of JSP and how regional readiness towards JSP. The results revealed Banjar City, Garut Regency, and Purwakarta Regency's readiness to change from manual to digital and develop ICT infrastructure and services, although it is still partial. Meanwhile, Bogor City, Cimahi City, and Cirebon Regency have developed ICT-based services by sharing data, but development between services is still being carried out separately. Then, research by (Lya et al., 2017) entitled *The Role of E-government and M-government in Shaping Jakarta to be a Smart City* examined the development and implementation of e-government and m-government within the Provincial Government of DKI Jakarta. The result showed that DKI Jakarta Province has extensively developed and implemented e-government and m-government in all government units, vertically and horizontally, to achieve the smart, efficient, and competitive city category. Meanwhile, the successful implementation of m-government is more complex because it depends on the attitudes or behavior patterns of the community members. Based on the objectives and key references in previous research, the novelty of this study is the method used, descriptive qualitative with an inductive approach to study the implementation of SPBE of the Provincial Government of Bali as a policy in realizing Bali Smart Island as a Bali Island development program with a smart city concept.

RESEARCH METHOD

This research was conducted at the Office of Communication, Informatics and Statistics (Diskominfos) of the Province of Bali, where government affairs in communication, informatics, statistics, and coding, which is the region's authority, is conducted. In addition, the functions and work units related to implementing the Electronic-Based Government System (SPBE) and implementing the Bali Smart Island program are also under the authority of the Bali Province Diskominfos. This study used a qualitative descriptive and inductive approach to describe implementing an Electronic-Based Government System in realizing Bali Smart Island. Data collection was done through observation, interviews, and documentation. The informants in this study were determined using a purposive sampling technique. The data's validity was checked through triangulation of sources and member checks by publishing research videos on the YouTube platform. Data analysis was carried out using an interactive model with the stages of data reduction, data display, and verification.

Table 1. The Research Informant

No.	Informant	Informant Code	Interview links
1	I Gede Agus Arjawa Tangkas, S.H., M.Si. as the Head of Infrastructure and Informatics Applications for the Bali Province Diskominfos.	A1	https://youtu.be/NYSqkgaY6mM
2	I Putu Riska Desthara, S.IP., as the Sub Coordinator of the Substance Unit for Supervision and Evaluation of Encryption Implementation	A2	https://youtu.be/vsV8Yu1c2-c
3	Ayu Irma Primayanthi, S. Kom., M.M. as the Sub Coordinator of the Bali Province Infrastructure and Technology Substance Unit of the Diskominfos.	A3	https://www.youtube.com/watch?v=Z5uUx_LSCnI
4	I Gusti Ngurah Puspa Udiyana, S. Kom., S.E., M.Si. as the Sub Coordinator of the Bali Province Diskominfos Informatics Application Substance Unit	A4	https://youtu.be/YnUCe6yG_sk
5	Novandika Dwipayana, S.T., M. Kom. As the Sub Coordinator of the Intranet Network Substance Unit and the Bali Province Diskominfos Internet Service	A5	https://youtu.be/00D7pz5j_V8
6	I Putu A. Angga Krishna, S.Kom. as a Member of the SPBE Technical Team for the Province of Bali	A6	https://www.youtube.com/watch?v=LTFPn-VQumo

Policy Implementation

Carl Friedrich (Pramono, 2020) stated that public policy is a series of actions proposed by individuals, groups, or governments in a certain environment with difficulties and opportunities, where policies are made to overcome them in achieving the goals. In governance, the stages of public policy (Ibrahim & Supriatna, 2020) start with policy problems/issues, formulating policies, establishing policies, implementing policies, overseeing policies, evaluating policies, and analyzing the impact of policies. Policy implementation is critical because a policy will be meaningless without good implementation and will not achieve the expected goals (Anggara, 2018). Pressman and Wildavsky stated that implementation is carrying out a policy, fulfilling promises in policy documents, producing policy output, and completing missions that must be completed in policy objectives. Meanwhile, Van Meter and Van Horn explain policy implementation as operational actions by individuals or government and private groups to achieve policy objectives (Handoyo, 2012). From some of these meanings, policy implementation is an activity to implement policies to achieve the policy's goals and objectives. According to George Edward III, achieving the goals of policymakers must be based on effective policy implementation. He further said that four variables determine the success and effectiveness of public policy implementation: communication, resources, the attitude of implementers, and bureaucratic structure (Anggara, 2018).

Smart City

Yang (2012) defined a smart city as an urban concept with sustainable economic development and a high level of quality of life for the community through the improvement of six main sectors (government, economy, quality of life, environment, human resources, and transportation) with a strong ICT infrastructure foundation (Darmawan, 2018). In line with that, Cohen (2014) also explained that a smart city uses ICT intelligently and efficiently in using its resources, produces energy savings, improves the quality of life, and builds an environmentally friendly economy (Hidayat & Soetarto, 2022). Meanwhile, Washburn (Putera et al., 2022) stated that a smart city collaborates with every important component of city infrastructure and services, such as education, public safety, transportation, administration, and other sectors. With increasingly sophisticated developments in technology, information, and the digital world (ICT), including big data, AI, and the internet, smart cities are deemed capable of solving social, economic, and environmental problems efficiently, effectively, and more accurately. Besides, smart cities are new innovative, and creative solutions to address public policy issues previously trapped by convoluted bureaucratic processes and inadequate human resources (Uddarojat, 2019). The International Business Machines Corporation (IBM) divides smart cities into six dimensions:

Smart People, Smart Environment, Smart Governance, Smart Economy, Smart Mobility, and Smart Living (Izzuddin, 2022).
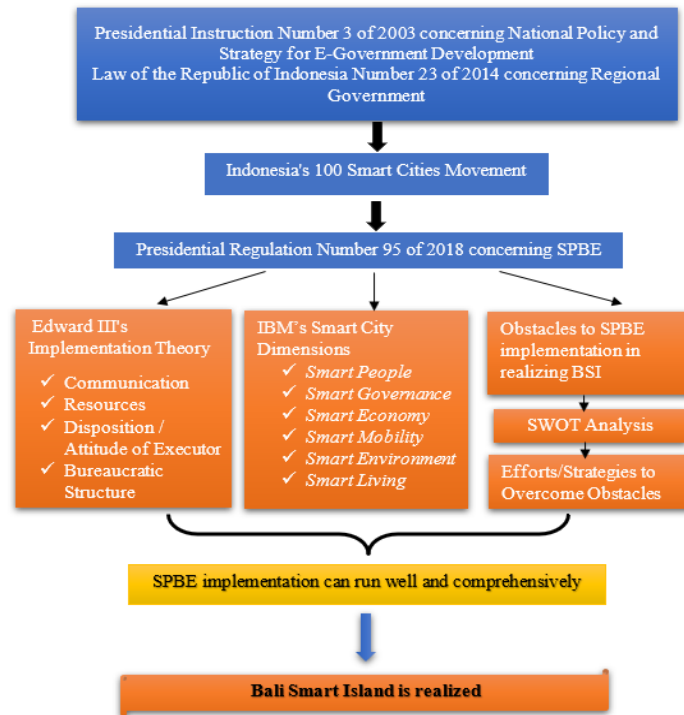

Figure 1. The Research Framework

In this study, SPBE of the Provincial Government of Bali in realizing Bali Smart Island is studied based on the four variables of successful policy implementation according to Edward III and analyzed the application of 6 smart city dimensions according to IBM.

RESULTS AND DISCUSSION
SPBE Implementation Towards Bali Smart Island

As a policy program, SPBE, in realizing Bali Smart Island can run well, is determined by four indicators or variables that must be fulfilled properly according to George Edward III (Anggara, 2018), namely as follows:

1. Communication is the process of conveying policy information from policymakers to policy implementers so that policy actors can know and understand the content, goals, directions, and target groups so that the goals and objectives of the policy can be implemented effectively and efficiently. Based on the results, the communication built by the Provincial Government of Bali in implementing SPBE towards Bali Smart Island was going well, as seen from the collaboration and integration carried out by the Provincial Government of Bali both with district/city governments, official/traditional villages, vertical agencies, and the community. A1 stated that the collaboration was carried out such as providing free wifi facilities at 1,834 points throughout Bali through the Bali Provincial Special Financial Assistance to districts/cities to facilitate access to information and public services to the SPBE service system of the Bali Provincial Government. To integrate the many SPBE services developed and make it easier for users to log in to a service account, A4 said that the Provincial Government of Bali had implemented the Bali Smart Island Single Sign On (SSO) system. SSO Bali Smart Island is a portal or gateway that connects users to all services integrated into the SPBE-Bali Smart Island System through a single dashboard. By logging in to SSO Bali Smart Island (https://sso.baliprov.go.id/login), users can automatically immediately access all SPBE services that have been integrated with the SSO without having to have an account to log in to each service. Then, the Provincial Government of Bali has also integrated services such as Virtual Offices with vertical agencies, district/city governments, and traditional

villages/official villages, and even the community can also be connected to this service so that government access is integrated as a whole. In addition, in providing good communication and information services, the Provincial Government of Bali has provided BMC Center services which have various integrated services in one application so that all information from the government can be well received by the public as well as optimizing information communication through social media of the Provincial Government of Bali (https://www.baliprov.go.id/). Good communication aspects can also be seen from the Bali Province public information disclosure index, which ranks second in 2022. Nevertheless, (Muka et al., 2020) found that data integration in the Bali Provincial Government SPBE was not good.

2. Resources; good policy programs require good resources, either human resources, budget, or physical resources. Based on the research, the aspect of human resources owned by the Provincial Government of Bali in SPBE implementation was good. A4 said that the Bali Provincial Government had recruited the SPBE Technical Team who had special competencies and qualifications according to organizational needs and were selected with an excellent system capable of becoming startups or the SPBE system home developer of the Provincial Government of Bali so that they no longer use vendors in developing application systems. Then regarding physical data sources, it is also adequate that the Provincial Government of Bali has provided free Bali Smart Island wifi service with good speed throughout Bali, both schools, tourist attractions, public facilities, and traditional/official village areas. To reduce the blank spot area, A3 said the Provincial Government of Bali is also building a magnificent Turyapada Tower in Buleleng Regency. In the internal agencies of the Bali Provincial Government, adequate ICT facilities have also been provided with a centralized access point server with a fiber optic backbone. The Provincial Government of Bali also has an integrated (on-premise) Bali Smart Island data center with a qualified category called Tier 3, which is collaborated with using a cloud server from Amazon. From a budget perspective, A3 added that the development of SPBE towards Bali Smart Island has always been a priority activity. Meanwhile (Muka et al., 2020) showed that the weaknesses of the SPBE Provincial Government of Bali are in the aspect of resources, such as not having an integrated data center.

3. Disposition/attitude of the executor, the attitude and commitment of the implementer to the policy or program that must be implemented because each policy requires implementers who have a strong desire and high commitment. In implementing the SPBE in the Bali Provincial Regulation, there is a high commitment from the Governor and Regional Secretary of the Province of Bali to transforming aspects of government and public services into the digital world, as stated in A4 as shown by the firm leadership of the Bali Provincial Government in using digital technology such as in virtual assembly activities, virtual meetings and virtual offices, virtual attendance, and performance. Firmness and commitment can also be seen from the routine leadership emphasizing optimizing the SPBE application system in government activities such as circulars to reduce spending on office stationery to support the digitization movement towards paperless. For the SPBE technical team, the leadership's attention was also evident in providing greater incentives than other non-ASN staff as an appreciation for the workload and qualifications of the SPBE Technical Team. Apart from this, to support the development of the digital ecosystem, the Provincial Government of Bali has also held the Bali Digital Festival as an annual event for developing digital innovation and creativity. A4 added that good or strong commitment from the leadership is important in the successful SPBE towards Bali Smart Island. In contrast, (Ardinata et al., 2022) found that transformational leadership is a solution to realizing a smart city in the era of Society 5.0

4. Bureaucratic; the structure is characterized by working mechanisms established to manage policies. From the research, the Provincial Government of Bali already has Governor Regulation Number 44 of 2021 concerning SPBE of the Provincial Government of Bali and the SPBE Master Plan Towards Bali Smart Island for 2020-2024 as a guideline and policy direction for SPBE development. In addition, in implementing the SPBE towards Bali Smart Island, several structures have been established through the Decree of the Governor of Bali, called the SPBE Coordinating Team, the SPBE Development Coordinating Team, which involves academics and professional experts, the Qualified SPBE Technical Team, and the CSIRT (Computer Security Incident) Team Response Team) for cybersecurity. In contrast, (Muka et

al., 2020) stated that the Provincial Government of Bali does not yet have an SPBE steering team with adequate functional and quality legality.

Bali Smart Island is a development concept for the island of Bali that is integrated with the principle of One Island One Management by applying the smart city concept. The International Business Machines Corporation (IBM) describes indicators for smart city development into six dimensions [18], namely:

a. Smart People can be seen by technology-based education (e-learning, IT infrastructure suggestions for learning) that are evenly distributed, the community of technology users, and the participation of the community in the use of technology. The results showed that applying the smart people concept in the SPBE towards Bali Smart Island has gone well, as seen by providing educational facilities such as free wifi and physical facilities to support e-learning evenly in all schools. Then, the Bali Province Disdikpora has also provided the Bali Melajah portal https://balimelajah.baliprov.go.id which provides multimedia-based learning media services for students. This service also has various integrated features that facilitate e-learning for both teachers and students, so it is expected to be a facility to form a generation of Balinese who are digitally competent and can compete globally. Besides, the Provincial Government of Bali has also facilitated the development of digital communities by implementing Bali Digital Festival as a smart *Krama* Bali catalyst.

b. To realize this mission, Smart Environment must apply applications and computers, sensors, AI, and other technologies to manage the environment sustainably. In this case, the Provincial Government of Bali has issued various policies related to protecting the environment, nature, and culture of Bali. One of them is the construction of TPS3R and Garbage Banks in traditional villages/offices throughout Bali as resource-based waste management in Bali that will protect the environment. In addition, the Provincial Government of Bali has issued a policy to encourage the development of the electric vehicle ecosystem to carry out the green energy transformation. Then to protect Balinese tourist attractions and culture, the Provincial Government of Bali has launched the Love Bali application (https://lovebali.baliprov.go.id/), which provides features for contributing tourists to develop and maintain Balinese tourist attractions and culture.

c. Smart Governance is characterized by community participation in policy-making, improving the quality of public services, and also transparency in government. The results revealed that this dimension had been well implemented, as seen from the many smart government application systems implemented, such as the integrated Virtual Office, virtual employee attendance with facial and location sensor technology, planning and financial applications, and SIPD. In the aspect of public service, the Provincial Government of Bali has also launched E-licensing (https://eperizinan.baliprov.go.id/login), Bali One Data (https://balisatudata.baliprov.go.id/), Bali Media Center (App Store/Play Store). Then as part of government transparency, a Development Control Information System (SIPP) has also been provided, which can be accessed by the public to see the realization of the Bali Province APBD (https://sipp.baliprov.go.id/).

d. The smart economy includes innovation and human resource development to maintain competitiveness. The results indicated that e-commerce services owned by the Provincial Government of Bali, Madeinbali, have been provided as a portal for promoting and marketing Bali MSME/IKM products. The Provincial Government of Bali has held a Virtual Development Exhibition, which is held routinely annually. There is also a Bali Digifest in improving the digital economy. Then in reducing the unemployment rate, the Provincial Government of Bali also facilitates the public to find job vacancies on the Online Job Exchange (BKOL) port. To control commodity prices throughout Bali, Sigapura Bali was also launched (https://sigapura.baliprov.go.id/). In addition, to facilitate capital for the community, especially MSMEs/IKM players in Bali, the Provincial Government of Bali provides KUR Bali services (https://www.kurbali.com/).

e. Smart Mobility is created by creating a smart transportation and mobility system to deal with congestion, pollution, and traffic violations. In this aspect, the Provincial Government of Bali has collaborated with the Bali Police by launching a road safety policy, one of which is Electronic Traffic Law Enforcement (ETLE). In addition, the Provincial Government of Bali

provides smart public transportation services, such as the Sarbagita Bus and the Trans Metro Bus, through the easy and inexpensive Teman Bus application, which also supports electronic transactions.

f. Three aspects must be met for Smart Living: adequate IT-based educational facilities, infrastructure with good and attractive regional tourism potential, and excellent ICT infrastructure to provide public services. The results showed that this aspect had been implemented properly. It can be seen from the availability of adequate IT-based educational services in application systems and supporting physical facilities. Then in the health sector, the Provincial Government of Bali has provided Queue services for the Provincial Government of Bali (Antrean Pemprov Bali), which are integrated with health facilities throughout Bali and BPJS Kesehatan. In the tourism aspect, the Love Bali service (web/mobile app) is available, an application that provides information on tourist attractions and events in Bali to tourists as well as the development of Virtual Reality for tourism development such as VR Pura Pulaki and Rindik Bali. In addition, a Disaster Information System (SIK) is also available in the disaster aspect.

Based on the explanation above, SPBE in Bali Smart Island has been going well. The variables of communication, resources, the attitude of implementers, and the bureaucratic structure in implementing SPBE towards Bali Smart Island have also been fulfilled properly and optimally, as shown by the achievement of the Provincial Government of Bali, which is the only province with the SPBE Index for 2021 in the "Very Good" category and, in general, is ranked fourth below the Indonesian Ministry of Finance, the Indonesian Ministry of Communication and Informatics and the Central Bureau of Statistics. Then the application of the smart city concept in the SPBE program towards Bali Smart Island, in general, is also quite adequate. The dimensions of smart people, smart governance, smart living, and smart economy have been well implemented. However, it is necessary to increase the use of digital technology in the dimensions of smart environment and smart mobility.

Obstacles in Implementing SBPE Towards Bali Smart Island
A1 said that one of SPBE's handlers in the Province of Bali was the SPBE Technical Team with special qualifications owned by the Provincial Government of Bali, which was the target of the private sector to work with them and to resign from the Provincial Government of Bali so that the potential for turnover was high. In addition, A1 added that another obstacle from vertical agencies is that the central government often requires us to use general applications that the Provincial Government of Bali already owns. Most central government applications are still made by vendors, making it difficult to integrate with the Bali Provincial Government's SPBE application system. Then internally, the consistency of regional apparatus is still lacking in updating data on the service system and website for each service.

A2 stated that digital competence and cybercrime are other obstacles faced by the Provincial Government of Bali in implementing SPBE towards Bali Smart Island. Cybercrime is widespread, but it is not only due to hacker attacks. Cybersecurity also basically depends on individual digital literacy. For example, ASN often pastes Google account passwords, virtual offices, and other accounts on a computer or directly saves passwords on the web. It is very dangerous because it is prone to other parties' theft and misuse of accounts. A3 said that not all state civil servants (ASN) are literate in digital technology. Many ASN are not fluent and tend to be phobic about digital technology. (Dewi & Prianthara, 2022) stated that there are still ASNs belonging to the immigrant generation, which is a challenge for implementing digital technology in the Province of Bali. On the other hand, many ASNs who are too technologically literate abuse ICT facilities, such as opening prohibited sites which tend to be dangerous because they contain malware that can cause an attack on the SPBE Bali Smart Island data center.

Meanwhile, A4 said that the obstacle to implementing the SPBE in the Province of Bali was that the ASN recruitment pattern did not meet the needs of smart ASNs to carry out ASN recruitment SPBE services currently still using the old pattern, which should be broken down with currently updated digital technology competencies. A study (by Jayendra & Darma, 2022) found that the ontological and regulatory foundations of the central government to form smart ASNs are still weak. Then A5 said that the challenge in realizing Bali Smart Island at this time was the

unstable budget condition after the COVID-19 pandemic and Bali's topography which still had blank spot areas.

Strategies to Overcome Obstacles to the Implementation of SPBE Towards Bali Smart Island

SWOT analysis is ideal for formulating policy strategies (Derama & Aransyah, 2022). SWOT analysis thoroughly studies strengths, weaknesses, opportunities, and threats (Umam & Mafruhat, 2022). The first step in formulating a strategy to overcome the obstacles to implementing SPBE towards Bali Smart Island is to analyze the internal and external factors: strengths, weaknesses, opportunities, and challenges. After that, strategic alternatives were formulated, which included SO (strength opportunity) strategy, WO (weakness opportunity) strategy, ST (strength threats) strategy, and WT (weakness threat) strategy, which can be presented in the following matrix (Difardi & Wike, 2022) in Table 2.

Based on the strategic alternatives listed in the SWOT matrix above, a focus on policy strategies can be developed to overcome the obstacles to SPBE implementation towards Bali Smart Island as follows:

1. Collaborating with Penta helix elements to hold local, national, and global scale activities and events based on digital technology to provide a domino effect in terms of economy, infrastructure, innovation, and digital technology creation that can be utilized in developing SPBE towards Bali Smart Island
2. Encouraging international investors to develop the digital technology industry in Bali so that it has a domino effect in developing smart city dimensions in realizing Bali Smart Island
3. Establishing an internal audit/assessor team to conduct periodic assessments regarding SPBE development, cyber security, and ICT infrastructure for OPD within the Bali Provincial Government to create healthy competition in SPBE development, as well as strong control and evaluation
4. Optimizing the Cyber Lentera program using the social media platforms YouTube, Instagram, Facebook, and the Spotify podcast as a medium for increasing digital literacy and cyber security and disseminating SPBE service information in forming Balinese krama and smart civil servants.
5. Establish an SPBE Forum throughout the Bali Province to form integrated development of the Bali Smart Island program with all relevant stakeholders through FGDs and hold training on certified digital technology.

Comparison of Research Results with Previous Research

This research complements previous studies but focuses on implementing an electronic-based government system for the Provincial Government of Bali towards Bali Smart Island. A comparison of the results of this study with previous studies is presented in the following table in Table 3.

CONCLUSION

Based on the results of the research and discussion above, the following conclusions can be drawn:

1. Implementing the Electronic-Based Government System (SPBE) in the Provincial Government of Bali in realizing Bali Smart Island has been going well and has done the six dimensions of the concept of smart city development. However, a significant increase is needed in digital technology in the dimensions of a smart environment and mobility.
2. Implementation of SPBE The Provincial Government of Bali, in realizing Bali Smart Island faces several obstacles. The consistency of regional apparatus in the SPBE application system is still not good. There is still a lack of digital literacy due to the immigrant generation, ASN recruitment patterns that do not yet support the fulfillment of smart ASN, there are still blank spot areas on Bali Island, rampant cyberattacks and crimes, as well as integration of application systems with external agencies of the Province of Bali.
3. There are several strategies to overcome the obstacles encountered in implementing SPBE towards Bali Smart Island, including: collaborating with pentahelix elements to hold events based on digital technology so as to provide a domino effect both from economic,

infrastructure, innovation and digital technology creation Bali Smart Island; encouraging international investors to develop the digital technology industry in Bali so as to have a domino effect in realizing Bali Smart Island; form an internal audit/assessor team to conduct periodic assessments related to SPBE development, cyber security and ICT infrastructure for OPD within the Bali Provincial Government so as to create fair competition in SPBE development, as well as strong control and evaluation; optimize the Lentera Cyber program using social media platforms for increasing digital literacy in forming smart "Krama Bali" and ASN; establish SPBE Forums throughout the Province of Bali to form integrated development of the Bali Smart Island and hold training on the use of certified digital technology.

In this study, the authors provide several suggestions regarding the implementation of SPBE in realizing Bali Smart Island as follows:

1. As a form of accelerating the digital transformation from the lowest element, namely the village, the Provincial Government of Bali should place IT, experts as assistants for digital transformation towards Bali Smart Island for every village in the Province of Bali.
2. The Provincial Government of Bali should form an Internal Assessor Team to assess and evaluate the implementation of the Regional Apparatus SPBE within the scope of the Bali Provincial Government and Bali Village Governments. This evaluation can be carried out by holding an award program for Regional and Village Officials with the highest SPBE index so that healthy competition will emerge from developing the SPBE system optimally, which will lead to the realization of a smart Bali Island.
3. The Provincial Government of Bali should hold certified Digital Competency Technical Training for ASNs of the Provincial Government of Bali and make these certification requirements part of the promotion for ASN positions to create reliable digital leadership.

FUTURE RESEARCH

This research examines the implementation of an Electronic-Based Government System towards Bali Smart Island as a policy program to realize an island-based smart city and finds that the dimensions of a smart environment and smart mobility are weak aspects that need to be improved. The next researcher can analyze the strategy for developing the smart environment concept, especially in waste processing which is the main problem of environmental management in the Province of Bali, and analysis of the factors that influence interest in using or identify related factors determining the success of public transportation services in the Province of Bali in realizing smart mobility.

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Table 2. SWOT Matrix SPBE Implementation Strategy Towards Bali Smart Island

	Strengths (S)	*Weakness* (W)
	1. Leadership commitment is high with SPBE implementation in realizing Bali Smart Island. 2. The Provincial Government of Bali has Specially Qualified Technical Personnel with qualified competence and a Coordinating Team consisting of Academics and Experts. 3. Political relations between the Provincial Government of Bali and the Regency/City and Village Governments are well managed. 4. Bali is currently in a demographic bonus with the majority of the population composition being dominated by the millennial generation and generation Z, who are technologically literate.	1. In making and developing application systems, Regional Apparatus Organizations (OPD) often do not understand their business processes, making it difficult to make optimal applications. Also, applications or websites managed by OPD are often not updated regularly. 2. The digital literacy of the ASN Bali Provincial Government and Balinese people is still low in the use of digital technology. 3. The post-pandemic Bali Provincial Government budget has not yet stabilized. 4. Geographically there are still areas (blank spots), especially outside the South Bali region.
Opportunities (O)	**SO Strategy**	**WO Strategy**
1. Bali, as a world tourism center, has attractiveness for stakeholders to invest in, including those related to digital transformation. 2. Bali has always been a national development priority. 3. Having SPBE regulations and master plans that support the development of Bali Smart Island 4. Having the availability of various digital platforms that provide convenience in carrying out digital transformation	1. Collaborating with Penta helix elements to hold local, national, and global scale activities and events based on digital technology to provide a domino effect both in terms of economic infrastructure, innovation, and digital technology creation that can be utilized in the development of SPBE towards Bali Smart Island (S1, S4, O1, O2, O3) 2. Encouraging international investors to develop the digital technology industry in Bali so that it has a domino effect in realizing a smart Bali Island (S1, S3, O1, O3)	1. Establishing an internal audit/assessor team to conduct periodic assessments regarding the progress of the SPBE development to create strong control and evaluation (W1, O1) 2. Optimizing the Cyber Lantern program using the social media platform YouTube, Instagram, Facebook, and the Spotify podcast as a medium for increasing digital literacy and disseminating information on SPBE services (W2, O4) 3. Optimizing grant assistance/budget sharing by the Central Government, Regency/City, and the private sector in improving ICT infrastructure (W3, W4, O2, O1)
Threats (T)	**ST Strategy**	**WT Strategy**
1. The turnover for the Bali Provincial Government's SPBE Technical Team is quite high due to the high private supply of their technical capabilities. 2. Central and district/city governments launch applications that use third parties. 3. The rise of attacks and cybercrimes against the Bali Smart Island application system and data center	1. Providing special income and binding agreements to the SPBE Technical Team as a form of appreciation to maintain loyalty to their performance (S1, T1) that is different from other contract workers 2. Optimizing the role of the SPBE Technical Team, the Bali Provincial Government can integrate data and application systems built by the central government, district/city governments, and traditional villages/offices to turn in with the SPBE application system to Bali Smart Island (S1, S2, S3, T2) 3. Optimizing the role of the CSIRT (Computer Security Incident Response Team) Team to conduct information technology security assessment (ITSA) of each SPBE service system using an international standard platform (S1, S2, T3)	1. Establishing an SPBE Forum throughout the Province of Bali to form integrated development of the Bali Smart Island program for all relevant stakeholders through FGD (W1, T2) 2. Organizing training on the use of certified digital technology (W2, T3)

Table 3. Comparison of Research Results

Research Findings	Critical Review	Previous research	Gap Analysis
SPBE Implementation in Realizing Bali Smart Island has been going well	In realizing the SPBE implementation towards BSI, it has been going well through good communication between stakeholders, quality resources, strong leadership commitment, and reliable structures and policies.	A study entitled *Development of the Bali Province Electronic-Based Governance System Master Plan* states that the implementation of the Bali Province SPBE has a sufficient level of maturity (Muka et al., 2020)	This study indicated that f the Bali Provincial Government's SPBE in realizing Bali Smart Island has been going well and has implemented the smart city concept.
Implementation of SPBE Bali Provincial Government in Realizing Bali Smart Island applies the concept of smart city development.	The application of the smart city concept in the SPBE program towards Bali Smart Island, in general, is also quite adequate by developing the SPBE service system and SPBE infrastructure into the six dimensions of a smart city. The results show that the dimensions of smart people, smart governance, smart living, and smart economy have been well implemented. However, it is necessary to increase the use of digital technology in the dimensions of smart environment and smart mobility.	The research entitled *Sumsel Smart Province: Implementation and Challenges of Readiness of Regency/City Governments in South Sumatra* (Damanik, 2019) indicates that the Provincial Government of South Sumatra is ready to implement Smart Province on the dimensions of technology and governance.	This study examines the implementation of the SPBE Pemprov Bali as a policy program and Bali Smart Island as the application of the Bali island-based smart city concept. In contrast, previous research has not analyzed the application of the dimensions of the smart city concept in Kepri Smart Province.
There are several obstacles to implementing SPBE Towards Bali Smart Island.	The results of the interviews, documentation, and observations show that some of the obstacles encountered are the consistency of regional apparatus in the use of the SPBE application system, which is still not good; there is still a lack of digital literacy due to the immigrant generation; ASN recruitment patterns that do not yet support the fulfillment of smart ASNs; there are still blank spots areas on the island of Bali; rampant cyberattacks and crimes; as well as application system integration with external agencies of the Province of Bali.	Research (Muka et al., 2020) entitled *Development of a Master Plan for the Electronic-Based Government System for the Province of Bali* states that the weakness of the implementation of the SPBE Pemprov Bali is that the integration of application systems and the use of general applications is not optimal; Does not have a standard internal policy related to SPBE services; The Provincial Government of Bali does not have an SPBE Steering Team and an SPBE Development Master Plan; Do not yet have a data center that all work units can utilize.	This study indicates that the Provincial Government of Bali already has an SPBE Master Plan Towards Bali Smart Island as a roadmap for the development of SPBE for the Province of Bali, Data Centers with Hybrid Systems, namely Physical Servers (on-premise) with Tier 3 category and Cloud servers from AWS; Then, from a policy perspective, Governor Regulation Number 44 of 2021 concerning SPBE of the Province of Bali has also been issued.
By examining the aspects of strengths, weaknesses, threats, and opportunities, several strategies can be formulated to overcome the obstacles encountered in the SPBE Implementation Towards Bali Smart Island.	Through SWOT analysis, a strategy can be formulated to overcome these obstacles by collaborating with Penta helix elements to hold local, national, and global scale activities and events based on digital technology; encouraging international investors to develop the digital technology industry in Bali; form an internal audit/assessor team to carry out periodic assessments; optimizing the Lentera Siber program using the social media platform as a medium for increasing digital literacy in forming smart Balinese krama and civil servants; formed the SPBE Forum throughout the Province of Bali to form integrated development of the BSI program and hold training on the use of certified digital technology.	Research (Muka et al., 2020) entitled *Development of a Master Plan for an Electronic-Based Government System for the Province of Bali* recommends several strategies: Making standard internal policies related to SPBE services; Preparing SPBE Development Master Plan; Forming the SPBE Steering Team with the legality of duties and functions; Perform application system integration and use of general applications as a whole; Determine the ICT budget and spending for all government functions; Create a data center that all work units can utilize.	Previous research only formulated strategies from weaknesses and opportunities (WO strategy/turnover strategy). Meanwhile, in this research, strategy formulation was carried out by analyzing all aspects through SWOT analysis.