

**Digital Economy and Local Policy:
Strategy for Village Development During COVID-19 Pandemic**

***Ekonomi Digital dan Kebijakan Lokal:
Strategi untuk Pembangunan Desa di masa Pandemi COVID-19***

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ABSTRACT

The development of digital villages today has been limited to providing administrative services and has not been used to develop the village economy and community welfare. The occurrence of COVID-19 pandemic has increased the challenges for village digital development. In spite of the difficulty, the digital economy through local policy contributes an opportunity to encourage rural economic resilience. This study aims to develop strategies of a digital economy for rural villages in the midst of a pandemic. The research is a case study located in Punggul Village, Badung, Bali Province. This research was conducted using qualitative research methods with data collection techniques using Focus Group Discussion and interviews. The result shows digital economic strategy could be implemented through several aspects including improving digital infrastructure facilities, enhancing the digital ecosystem, and identifying the potential and village featured products. Furthermore, cooperation between stakeholders needs to be strengthened in line with the local values.

Keywords: *digital economy, rural development, village*



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INTRODUCTION

The development of digitalization has become a necessity, especially during the pandemic situation. During the pandemic, the government implemented restrictions on community activities to prevent the spread of COVID-19. However, restrictions on community activities have had a negative impact on the socio-economic activities of the community and ultimately affected the economic development and welfare of the community. The COVID-19 pandemic caused an economic contraction of up to -5.32 percent year on year, reducing investment by 8.6%, which had an impact on business activities (BPS, 2020). In the long term, the Pandemic could lead to a recession caused by lower investment (World Bank, 2020). The economy in the village has also been affected by the pandemic, for example in the agricultural sector. Farmers find it difficult to distribute their produce; decreased demand and high production lead to lower product prices. In the tourism sector, the COVID-19 pandemic has paralyzed tourism business activities. Tourist villages lose income. In this situation, the use of digital is one of the strategies to support the economic activities and functions of the community, including people in rural areas. Digitalization has a role to support community activity and the economic function, including people in rural areas. Digitalization is an opportunity to support economic development, promote social inclusion and develop and maintain resilient communities (Skerratt, 2010; Townsend & Fairhurst, 2013; Wallace, 2013). Digitalization is represented in the digital transformation which is currently changing the dynamics of society (Agarwal, 2020). Digital transformation is defined as a technological change influencing all aspects of human life and forming the information society that utilizes the internet (Wallace, 2012). Digital transformation like the digital application and Internet of Things (IoT) has great potential to provide socio-economic benefits for rural areas, in various aspects such as health, agriculture, and financial sectors (Philip et al., 2017)

Digital transformation and rural villages appear as contradictory propositions. Rural villages are considered having less ability to adapt to digital transformation and adhere to rapid changes. Research shows that villages deal with various problems to generate digital development such as infrastructure, human resources, and governance (Onitsuka et al., 2018). The European Commission reports that across Europe, rural areas are lagging in terms of digital connectivity and accessibility (European Commission, 2017). Only 40% of rural households in Europe have access to high-speed broadband services compared to 76% of total European households. Rural areas mostly depend on weak internet speeds (Skerratt, 2014). Weak rural digital access and connectivity raises pressure to social and economic development (Salemink et al., 2015; Skerratt, 2014). Moreover, numerous studies suggest that the utilization of digital technology in rural areas may cause threats and unfavorable impacts to rural people, for instance the digital fraud, data stealing and hate speech (Kilpeläinen & Seppänen, 2014; Malladi et al., 2021) The lack of knowledge on financial cybercrimes lead to mistrust among rural population (Malladi et al., 2021). Digital literacy through financial literacy becomes a media to increase the awareness of rural people (Lusardi, 2019). Therefore, access and connectivity issues are not only related to the availability of technology, but also related to the human capability to utilize technology (Salemink et al., 2015; Townsend & Fairhurst, 2013).

The digital transformation in rural areas is currently affected by the uncertain pandemic situation. However, villages in Indonesia experienced significant changes with the enactment of legislation number 6/2014 about Villages. The regulation establishes a new institutional framework for local authorities to regulate a local development. The regulation provides budget support through Village Funds for village development (Oktavia & Wihastuti, 2020). The regulation promotes the Village Information System to strengthen the local governance. The village information system increases transparency, public information disclosure, and community development (Sulistiyowati et al., 2017). Local authorities are emerging as a sign of local development with valuable support for digital transformation in a pandemic situation.

One of the ways to implement digital transformation is through the digital economy. It is regarded as an option for villages to respond to pandemic outbreaks (Dannenberg et al., 2020). The concept of the digital economy was first introduced by Don Tapscott in 1995. The digital economy is an economic activity based on digital technology. The digital economy is also known as the internet economy, digital-based economy, or new economy. The digital economy supports the supply and demand of commodities through digital information. Digital infrastructure and digital ecosystem are two important components to build a digital economy (Bukht & Heeks, 2018)

The digital economy can create employment opportunities for community. The concept of Digital economics has been developed by researchers. One of them is the Digital Economy Development Model (Bukht & Heeks, 2018) which is a *middle range theory*:

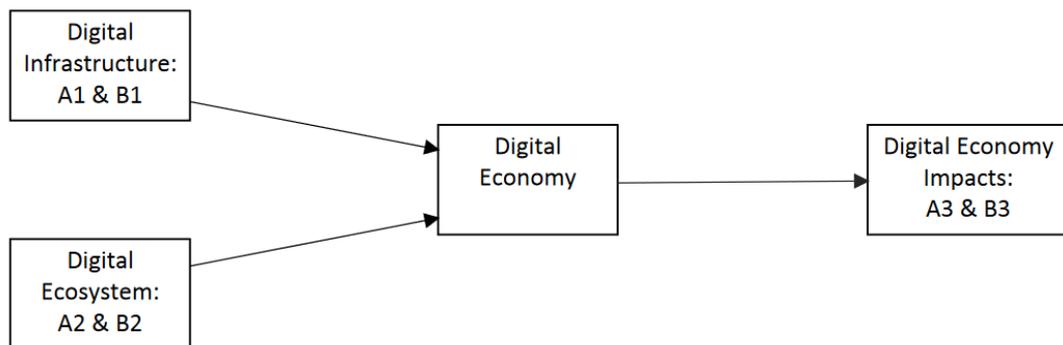


Figure 1. Digital Economy Model. Rumana and Heeks (2018)

1. A1 Digital Infrastructure Challenges

Digital infrastructure challenges include:

- a. Power: non-existent or unreliable, low-quality, high-cost electricity
- b. Telecommunications: cellular and broadband infrastructure that does not exist, high cost and poor quality
- c. Devices: low penetration rates and high costs from servers, smartphones, tablets, PCs, sensors and etc
- d. Applications: low availability for instance cloud services and digital platforms. The application does not have many features and inaccessible.

2. A2 Digital Ecosystem Challenges

- a. Human Resources
- b. Institutional Support
- c. Governance

3. A3 Digital Economy Deprivation

- a. Digital Exclusion
- b. Digital Gap

4. B1 Digital Infrastructure: ICT infrastructure, electrical supply, data capacity

5. B2: Digital Ecosystem consists of human resource capability, innovative economy opportunity, legal framework and institutional assistance. Furthermore, Digital Economy Governance includes the strengthening of digital economy policy, transparency, accountability, effective and efficient services

6. B3 Policy to address Digital Economy Deprivation: Financial support for inclusive digital infrastructure and access, development of local content, inclusive ICT (Information and Communication Technology) assistance in order to support economy development and data security policy, protect digital rights and reduce digital negative impacts.

The figure above shows the entire simple input-process-output value chain of a digital economy model. The first is [A1] infrastructure challenges which are important factors in the development of the digital economy. The digital infrastructure problems consist of the followings: first, Power: non-existent or unreliable, poor quality, and high-cost electricity; second, Telecommunications: non-existent or slow and/or expensive and/or poor quality cellular and broadband infrastructure; third, Devices: low penetration and high costs, smartphones, PCs, sensors, etc.; fourth, Applications: the minimal availability of the latest applications and digital platforms; fifth, Data content: the non-existent or relatively incomplete, inaccurate or inaccessible digital data. Policies [B1] that can be addressed [A1] are: first, increase the effectiveness of electricity and encourage the private sector investment in electricity infrastructure; second, improve telecommunications by investing directly in telecommunications infrastructure, encourage the private sector to invest, apply appropriate regulations, and review the costs/benefits of taxation, networks and devices; and third, improve the quality of data by promoting the use of interoperable data standards, invest in capacity for data

retrieval, and encourage the data/server/cloud development. The second point in the digital economic model is the challenge of the [A2] digital ecosystem. The digital ecosystem consists of human infrastructure, institutional infrastructure, and governance. Human Infrastructure challenges include lack of motivation, lack of digital skills including basic literacy and digital literacy. Institutional infrastructure includes financing for the digital economy and digital markets. Governance encompasses the common challenges that include non-existent or outdated digital economy policies. Policies [B2] that can be taken [A2] are: first, to increase the capacity in the implementation of the digital economy, improve the investment, increase the consumption of the digital economy, and support the institutional infrastructure; and second, to maximize the effectiveness of digital economy policy structures and processes by strengthening digital economic policy governance.

The third point is the disadvantages [A3] of the Digital Economy. The growth of the digital economy brings many benefits to the countries' income because of creation of businesses, jobs and livelihoods; etc. However, the impacts of the digital economy are also detrimental including: first, digital exclusion: the relative inability of certain groups (women, the poor, the elder adults, people with disabilities, certain ethnic groups, and those who live in rural areas) to participate in the digital economy; second, digital inequality: there are inequalities that arise from participation in the digital economy; and third, capital gains are much more than labor; foreign companies benefit more than local companies; men benefit more than women; etc. The [B3] policies adopted [A3] are targeted to finance the inclusive digital infrastructure, develop local content, and secure digital environment.

The digital economy model can be adapted in rural villages. The benefit enhances empowerment of the community. Various examples of digital use, for instance e-government, small medium enterprises and tourism in the village prove that digitalization generates public services and economic empowerment (Sulistyowati et al., 2017). Local government plays a vital role to maintain the sustainability of the social and environment aspect in line with a digital development. The use of technology and information is expected to be able to increase the improvement of human resources, as a means of democracy and also improve the welfare of rural communities. This motivation has triggered the digital village programs that respond to the pandemic in several regions in Indonesia.

In the development of local village economy, the government has established a priority program including the village-owned enterprises (BUMDesa) and the village featured product (Produk Unggulan Desa/Prukades). BUMDesa is an alternative to the economic enhancement of rural communities. BUMDesa is quite unique in its organization because it is a business built on the basis of the collectivity between the village government and the community. In the Regulation Number 6/2014 concerning village Article 1 paragraph (6), it is explained that BUMDesa is a business entity that all or most of its capital is owned by the village through direct inclusion that comes from villages source funds and use the fund to manage assets, services and other business and enlarge the business to bring welfare of the village community.

Besides BUMDesa, there is another priority namely Prukades (Produk Unggulan Desa) or village featured product. Prukades is an excellent product with high quality and has unique characteristics of the village. Prukades aims to drive the local economy and entrepreneurship both the business and the start-up (Hadi, 2018). It is based on the Decree of the Minister of Villages, Development of Disadvantaged Regions and Transmigration Number 83/2017 about the general guidelines of the Village Innovation program. Prukades encouraged the creation of a network of cooperation between villages conducted through cooperation of BUMDesa namely BUMDesa Bersama (cooperation between BUMDesa). The capital of Bumdes Bersama is used to operate small-medium scale enterprises. Both private and third-party banks can act as marketing agents, off-takers and managers of local commodities to add value to the product. The central government and local governments have a role to gain economic benefits from the value-added innovation of village products through digital innovation and transformation. BUMDes and Prukades are one of the foundations of the local economy that could support the development of the digital economy in the village.

The government has carried out digital infrastructure development in various regions to implement the digital village program. According to the APJII Survey (Association of Indonesian Internet Service Providers), in 2017 there were 143.26 million internet users and 171.17 million Indonesian internet users in 2018 (APJII, 2017). Villagers, both in rural villages and urban villages, still access the internet through tablets or smartphones rather than computers or laptops. Based on the Village Potential Data for 2018 concerning the development of information technology in the village, nationally, (1) 82% of villages have internet networks; (2) 96% of village residents use cell phones. Internet signal coverage

per village, namely 4G / LTE, already exists in 20,489 villages, 3G / H / H + / EVDO in 31,874 villages, and 2.5G / E / GPRS in 9,496 villages, while 13,577 villages have no internet signal.

However, the existence of this digital infrastructure is still limited to providing basic services and not yet on how digitalization is used to develop the village economy. Punggul village, Badung, Bali Province establishes innovative services in administrative services and local application for digital economy. In this village, a digital infrastructure has been built to support the development of information and communication technology (ICT), including Wi-Fi facilities installed in each public facility.

With great potential and an adequate digital infrastructure, local institution and local potential, the digital villages are able to overcome the pandemic challenges. Digital-based economy is an opportunity to support the economic recovery of rural communities. The basic concepts are based on Digital Economy Model by Heeks and Rumana (Bukht & Heeks, 2018). The other opportunity is the local policy is supported by Indonesia Regulation about Village, the Act Number 6/2016. The village can provide budget allocation and regulation to support the digital utilization for economy development as an innovative solution. Based on these reasons, this study aims to develop a strategy in developing the digital economy in Punggul village, Badung, Bali, in order to encourage the village development.

METHODS

The research used qualitative methods with a descriptive analysis approach introduced by Moleong (Moleong, 2016). The descriptive analysis is to describe, explain and answer in more detail the problems that will be studied for one event (Sugiyono, 2015). The results of the data were described through descriptive narrative words to explain the meaning and certain social situations (Moleong, 2016). The data focused on the digital transformation situation and local government policy. The research was oriented to reveal the social change and understand the policy impact in the community. The location of the research was in Punggul village, Badung, Bali Province. The location was purposely selected because Punggul village is one of the digital villages that has had basic infrastructure (Wi-Fi/Internet for the village). Data collection was gathered through Focus Group Discussion and in-depth interviews to analyze strategies in the development of digital economies. There were 12 informants interviewed that included the Head of the Village, regional government organization namely Community Development and Village Agency, BUMDes Managers, leader of Community Informatuin Groups (Kelompok Informasi Masyarakat), stakeholders, youth, women, Community as the users of WI-FI facilities and the community leaders. For the FGD process, there were 10 people consisting of male and female internet users, youth, Community Information Groups (KIM), and village officials. The FGD process was carried out once. Researchers analyzed the important points of what exists in and beyond the community using digital media in the village.

RESULTS AND DISCUSSION

The Opportunities: Infrastructure and Governance

The development of digital economy has important elements that must be fulfilled. The elements are digital infrastructure and digital ecosystem. Punggul village has diverse potentials that can be used to enlarge digital opportunity development. Punggul village already has a sufficient digital infrastructure, and it becomes a basic foundation in developing the digital economy. It can be seen from the availability of energy such as electricity and telecommunications.

“The village officers provide free internet facilities at several places in the village that can be accessed by the community, especially school children. At first, the housewives talked about online learning for their children and expressed their hope that the development of a digital village could help the children with their online learning activities in the village.” (Head of Punggul Village).”

Through these stories, the village government gives priority to provide internet infrastructure for village needs. The government started the activity by ensuring a stable electricity supply for the internet to be accessed properly. The government also provides generators to maintain the availability of electricity. The quality of electricity in Punggul Village is reliable for the development of digital utilization. The availability of good-quality electricity is important because it supports important

infrastructure. Limited electricity hampers the internet and telecommunications signals. This is due to the disruption of Base Transceiver Station (BTS). BTS is a mobile telephone transmitter and receiver. BTS transmit and receive radio signals to mobile devices and convert those signals into digital signals to terminals in processing the data.

The Punggul village government supports digital development through various policies and programs. Punggul village has developed an internet network (Wi-Fi) in the village office and in all public facilities in the village such as school, health facilities (Puskesmas), some temples where the community gather, and area with local traditional leaders. The free Wi-Fi service allocates up to 1.5 TB per month. Based on the results of interviews and Focus Group Discussion that the Wi-Fi internet speed provided by the village has not reached the homes of residents. This becomes an obstacle when people access information and eventually people use the private internet.

However, the government only gives internet access in public facilities with some considerations. The first consideration is that public facilities will become digital space for communities to gather. The community can take care of the facility, and it can also become the social control of internet usage. The community can also maintain a social interaction and do different kinds of activity to enhance their knowledge and skills using the digital media.

Internet access is an important foundation for the development of the digital economy, but it is facing two major problems: building network capacity and expanding network coverage (WEF, 2015). Regardless of the condition in Punggul village, the government seeks to provide internet access for the community for free at public facilities. The provision of internet access in Punggul village is supported by the regional government of Badung, so that villagers can access the services freely. Nowadays, the ICT development in Punggul village recently reached the stage of developing e-government.

“2016 was when we participated in the use of digital technology in villages in East Java. (There were) lots of inspiration, especially, to improve the governance. I think that if my village is able to follow the digital village sample in East Java, there will be many benefits. What we did first was to reorganize the data through a digital database. This could secure the citizen data. For example, if a disaster like flood happens, the data will be in danger of being lost. Digitalization helps to manage data and services effectively. During pandemic outbreaks, for example, the process of providing assistance to the community can be carried out based on appropriate data, and this eases the service delivery.” (Head of Punggul Village)

The local government in Punggul Village has established digital transformation since 2016. The government supports digital development with local policy and budget allocation. The head of the village together with the village officers held a meeting to discuss the digitization plan for development. To support this plan, the village government thinks about the need to increase the capacity of human resources in the village. The head of the village then involved the youth organizations and the Community Information Group (KIM) to participate in the village database management process. The youth are expected to have the knowledge about their village condition and be able to provide suggestions for its development.

The local government views the importance of capacity building to increase the human resources quality of staff. The head of the village asked his staff to attend the computer training two times a week, and this activity soon developed, where the youth of the village who wanted to learn about computers could take part in learning activities. The Punggul Village develop digital applications to facilitate administration service of e-government, public information system and digital economy such as Population and Administration Information System (Sistem Informasi Administrasi dan Kependudukan-SIADEK), Integrated Village Administration Geographic Information System (Sistem Informasi Geografi dan Administrasi-SIGADIS), YouTube Channel Punggul Information Centre and Peken online. SIADEK is information systems of administration and population of communities in the village SIADEK provides quick service about data of communities in the village. The system facilitates the management of the administration and correspondence service, as an example of a cover letter for state health insurance (BPJS) or other administration. Population related data has been stored in the system so that when data is needed, the application can search for data effectively. The system also stores various mailing templates, thereby avoiding mistakes in mail printing. The process of making the letter can also be completed in a quick time which is about five minutes. The system has integrated data and document templates that made the administration service effective and efficient.

The SIGADIS (Integrated Village Administration Geographic Information System) application is a system with several features related to village geographic information, government, including the collection of migrants who are widely found in Bali. The village development information is available in the application and open to the community and stakeholders. The government also develops e-attendance to support government performance and facilitate the reporting of mobile activities. The stored data is compiled using a digital archive. The government prepares risk mitigation against disasters through the digital archive. Furthermore, the digital archive is developed with a data security system.

In addition, the village government also manages the website and YouTube Channel namely Punggul Information Center as a form of public information about village development and activities. Information is available in the form of text (news) and videos. Information about the village activities is open to the public. The important point of establishing a digital economy in a village is how digitalization is used for the development of the village including the participation of the community. For example, the village development program has been integrated into a digital service. The digital development is expected to provide opportunities for people to participate and increase their economic opportunity especially in a pandemic. The digital media facilitate government assistance programs during pandemic such as integrated data for cash direct assistance, responsive service, socialization and education about pandemic preventive activity.

The human resource improvement in Punggul Village is done by: first, ICT training for local government to improve knowledge and skills. It is important to increase the community awareness of the development of digital technology utilization. The training was held once a week on Thursday. Local governments also involve village youths to attend ICT training. The village government implements an ICT program for youths. This program includes computer training for a year, traditional script learning using ICT and networking. The local government conducts a selection process for youth who wish to participate in training programs. There are only 10 youths who can join a year computer training program for free. After attending this training program, the youth can work to help the government with the digital management of the village data. The Punggul Village has a Community Information Group that will provide news and manage the village social media. The Community Information Group also provides local content news. Before the news is published, the group needs to get approval from the local government. It is in accordance with the reliable condition of the village and avoids hoax news. The local content news can be seen as a transparency activity of the government. Besides news, social media are also used to increase community participation in the government performance.

The Challenges: Security and Sustainability

The commitment of all stakeholders is required in order to establish governance and institutional-based digital economy. It is necessary for the community, local governments, and local institutions to share vision in building a digital system. The community and stakeholder cooperation is the key to success. It takes human resources, budgets, regulations, software, supporting equipment and community support to develop public information systems for digital ecosystem. Punggul Village has made transformation of ICT both in administration services and human resource capacity. The transparency of governance can also be seen from the disclosure of village funds data, village income, planning, implementation, and reporting. The government enhances to enlarge the benefits of digital transformation in line with the management of traditions, customs, arts, culture and resources. However, the digital development in Punggul still faces many kinds of challenges. The following is the results of the challenge in developing the digital economy in Punggul Village, Badung, Bali Province:

Table 1. Challenges of Digital Economy

Elements	Challenges
Infrastructure	a. The management of the database and system depend on the third parties. The government should assure data security.
	b. The use of applications by public is not yet optimal because there are still many residents who choose to apply a direct service.
	c. Wi-Fi Internet network speed in public facilities is still weak. It is influenced by the increased number of users.
	d. The participation of several groups is still low (for instance women, the vulnerable and the poor, elderly, people with disabilities)
	e. The mitigation of negative impacts from internet has not been developed (e.g. cybercrime)
Digital Ecosystem	a. Financial support of ICT training for youth is limited
	b. Policy to assist ICT skills and economy knowledge needs to be sustained
	c. Economic institutions need to cooperate and increase their capacity and competency

From Table 1 it can be seen that the challenge the village government needs to address is the data security and sustainability of data management. The village government establishes a system with a third-party sector. The cooperation has a positive impact and contribution to the understanding and management data to the village government staff. However, the government has to develop a digital road map plan that maintains the sustainability of data management.

Strategy to support Digital Economy in Punggul Village

To develop the digital economy while answering some challenges of the findings, the authors use the digital Economic Development Strategy Model. The model is developed by Bukh and Rumana. This model shows 2 important aspects, namely infrastructure and digital ecosystem. Based on a study on the digital economy in the village, the featured products to increase competitiveness have an important role in the development of the digital economy. Competitiveness is fundamental for economic advancement and for rural development (Podgorskaya & Schitov, 2020). Therefore, the digital economy strategy in the village needs to be combined with the local characteristics of the village, namely through village featured products. The ultimate goal of this strategy is that digital economic activities can have a positive impact on society.

Numerous research has been conducted to discover the digital economy on a national level. The study of the digital economy in Punggul village raises issues about the digital economy linked to rural development. The concept of service ecosystem by Lusch and Nambisan states that rural areas that enhance resources can empower the local economy (Yulizar et al., 2022).

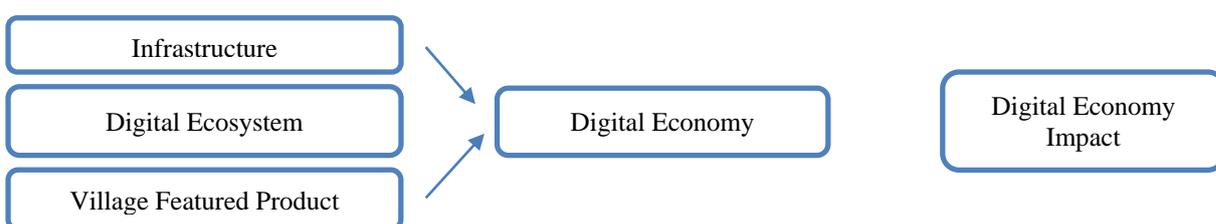


Figure 2. Digital Economy Strategy in Punggul Village

There are several aspects that need to be developed in terms of digital economy development in Punggul Village. The following strategies discuss possible factors that can significantly increase the digital economy development in rural villages.

Strategies to Strengthen Infrastructure

In accordance with the Digital Economy Development Model by Bukh and Rumana (Bukht & Heeks, 2018), the first important aspect to mention is the provision of infrastructure. The challenge of infrastructure development is one of the key factors in the development of the digital economy. The digital infrastructure issues consist of the following: first, Electricity: the availability of electricity in

Punggul village is relatively stable. Villages rarely encounter problems with power outages. The village government also provides a generator to prepare for power outages. Second, Telecommunications: the quality of telecommunications and broadband infrastructure in the village of Punggul is quite good. Telecommunication access in the village is 3G/4G with various internet providers, and the community could still afford the price of providing broadband. Third, Device availability: device ownership is one of the important things that need to be considered in developing the digital infrastructure. The rural community of Punggul uses smartphones in general, and there are few residents who use polyphonic cell phones. Fourth, Applications: the provision of the latest applications and digital platforms determines the extent to which people can take advantage of digital services. In Punggul, the village government innovates by making various applications to support the performance of government services. Fifth, Data content: the availability of digital data content has a role as the village digital database, assisting in effective service processing and data-based planning. The population database in Punggul village is professionally managed. However, the government needs to pay attention to data updates and the flow of data management to services. Some of the data is still not archived digitally due to the rules of making written records in books.

The strategy formulation related to infrastructure facilities was developed based on the digital economy model by Bukh and Rumana (2018). The digital economy development strategy related to infrastructure has 5 main factors. Researchers conducted a study of these 5 factors with field conditions in Punggul village. The findings related to the infrastructure review are as follows:

Table 2. Infrastructures Condition

Infrastructure Dimension	Condition			Strategy
	Not Good yet	Pretty Good	Very Good	
Electrical power			✓	
Telecommunication & Broadband	✓			Telecommunication and Broadband Quality Improvement (broadband quality and internet speed)
Device		✓		Provision of devices that can be used together in communal spaces
Digital Apps/Platforms		✓		Service improvement through digital platforms
Data Content		✓		Provision and maintenance of data content (data security)

Source: field research data, 2020

The infrastructure condition in Punggul village became the basis for formulating strategies. Based on the table, the strategies that could support the digital infrastructure can be formulated as follows:

1. Improvement of Telecommunication and Broadband Quality (broadband quality and internet speed). This strategy shows that it is not only infrastructure but also the ability to improve the quality of its utilization. This strategy is also based on field conditions where internet needs are used for village office administration and for learning in schools. The government can encourage stakeholders' involvement to collaborate in providing telecommunications access that could accommodate the village needs.
2. Provision of devices that can be used together in communal spaces. The village government provides laptop and computer facilities at the village office. Laptops can be used for the community or students to improve their ability to use computer devices. However, the number of people who use laptops in the village office is still very minimal, usually only the young people or students. The provision of laptops in communal spaces will increase the number of people in utilizing computer equipment and increase their abilities.
3. Improved services through digital platforms. The village government has provided various applications to support e-government. The digital platform is still in the development stage, therefore, improvements in data management features and data utilization for mailing services are needed. Improving services through digital platforms should not only include government services but also to support economic opportunities in the village. The government can develop a hub to

connect stakeholders to be involved in economic development in the village through digital platforms.

4. Provision and maintenance of data content (data security). The government has already had a database for basic data. The next thing that needs to pay attention to is data security. Especially if the data management is handed over to a third party. Confidentiality of population data is the responsibility of the village government. Therefore, a strategy to improve data security in data management is appropriate.

Strategy to Digital Ecosystem

There are some determining factors based on the Digital Economy model. These factors are the capacity of human resources, institutions, government, the use of digital technology in economic activities and strengthening regulations. The following is the reality condition of Punggul Village related to digital economic indicators:

Strategy to support Digital Ecosystem

These factors are the capacity of human resources, institutions, government, the use of digital technology in economic activities and strengthening regulations. The following is the reality condition of Punggul Village related to digital economic indicators:

Table 3. Digital Ecosystem Indicators

Digital Ecosystem Dimension	Condition			Strategy
	Not Good yet	Pretty Good	Very Good	
Human Resources		✓		Capacity improvement for village officials and the community
Institutions including access to finance	✓			Providing financial support for the development of digital economy businesses, both individuals and SMEs
Governance (Regulation and Budget Allocation)		✓		Strengthening digital economic policy governance through village government policies (budget allocation and regulation)

The Digital Ecosystem condition in Punggul village became the basis for formulating strategies. Based on the table, strategies that could support the digital infrastructure can be formulated as follows:

1. In implementing the digital economy, both village officials and the community must have sufficient skill and capacity. Capacity improvement is needed because technological changes require new qualifications through special education or training (Silva & Silva, 2015), to improve their ability in the form of technical skills in digital utilization (European Commission, 2016). An important factor to development is investment on human resources (Peña et al., 2019). Improved qualifications in the field of technology are obtained through trainings within the organization and community. Based on the theory and literature, the Punggul village can develop a strategy on improving the knowledge and skills of human resources through capacity improvement.

The situation in Punggul village is quite interesting because the government holds computer classes for village office staff and community. Besides that, the government has involved youth in the ICT transformation in government office. Punggul Village has a Community Information Group (CIG) as an institution to collect information from the community and socialize government activities to the community. The Community Information Group is supported by the youth of Punggul village. CIG also plays a role in supporting the digital development process carried out by the village government. CIG bridges communication between the village government and the community to collect related suggestions and community responses to digital developments in the village such as website content, application features or suggestions to improve administrative and government services.

The government is expected to continue creating a capacity building activity as well as developing digital features and applications for institutions and the economic community. The government

needs to pay attention to community groups and community organizations in the village. It is important to remember that there are various groups in the village such as vulnerable groups, women groups, elderly people, and people with disabilities. The inclusive access broadens people to participate in and benefit from the digital development.

The capacity improvement can also be done by utilizing a digital space (i.e., Balai Banjar which is facilitated by free Wi-Fi from the government). The digital space is a place where people can access Wi-Fi and public spaces for public outreach regarding digital developments. Wi-Fi users ranging from 10 to 50 years old. Users who are students perceive the free internet as a contributing factor to their educational learning. Students use Wi-Fi for homework and study assistance. The digital space is also a place to increase people's skills and knowledge about ICT and ICT opportunities. The role of the Community Information Group and Kelian Banjar is a mediator and facilitator for understanding digital use. In addition, a technical training is needed for KIM and Kelian Banjar regarding the use of digital to increase ICT capabilities. Therefore, they can provide training to the community. The provision of free Wi-Fi at several points in the village has been socialized to the community and also through a joint deliberation. Punggul Village is a village that still holds cultural customs; therefore, in implementing the government activities or programs, the village government involves indigenous peoples and community leaders in providing criticism and suggestions. The presence of free Wi-Fi needs to be mitigated against its negative impact. For example, the content and behavior of internet abuse must be anticipated.

2. The second strategy is providing financial support for the development of digital economy businesses, both individuals and SMEs. Digital economic development in rural areas requires not only capacity improvement but also adequate financial support. Punggul Village has already had great potential for digital economic development, it's just a matter of maximizing the financial support. This can be done by cooperating and building networks with various parties that can encourage the development in Punggul Village, for example public-private partnership, digital economy investments, development of digital start-ups and SMEs (Bukht & Heeks, 2018). The village government develops a plan to support economic development through BUMDesa which involves youth. The village government needs to design an inclusive business road map that enables youth, women, and various group in the village to participate. Currently, economic activities funded by the village have not developed because they are still in the early stages. The government is still at the stage of involving youth groups in the context of village data management.

“We got the opportunity to understand data management in the village. We are sometimes even asked to help in tidying up the data. The head of the village also encourages youth to be active in writing content on the village website and support the village festival.” (Youth from Community Information Group, 2020)

Punggul Village has a Community Information Group (CIG) as an institution to gather information from the community and socialize the government activities to the community. CIG bridged between the village government and community to gather related advice as well as the community's response to digital development in villages such as website content, application features or suggestions to improve administrative and government service. The government is expected to continue developing digital features and applications for the institutional and economic community.

3. Local government administration plays a key role in advancing the progress of digital transformation in Punggul village. The government needs to increase public service accountability in the form of improving the quality of public services and information disclosure; develop a digital economy strategy through a multi-stakeholder collaborative approach, and also involve the community in decision-making for digital development, such as conducting policy evaluations, building initiatives and innovations (Bukht & Heeks, 2018).

The local government in Punggul Village has supported digital development policy including budget support, e-government policy and human resource competence. However, the government needs to be more active to encourage the economy innovation and entrepreneurship. The BUMDesa still needs support from the budget side, capacity building, market support and expansion of inter-village economic cooperation

Village Featured Products

Punggul Village is one of the villages located in Badung Regency, precisely in Abiansemal District. Punggul Village consists of 5 official banjars, namely the Banjar Teguan, Banjar Padang, Banjar Tengah, Banjar Trinadi, and Banjar Kelodan. Punggul Village has great potential as a tourist attraction. Punggul Village has these attractions, namely Beji Geria Waterfall and Kerab Langit Cave. In the field of creative economy, the village of Punggul has great potential because the community uses agricultural and plantation commodities to become home industry products such as virgin coconut oil, taro chips, which also enhance the village economy. The development of Punggul Village cannot be separated from the support of financial institutions such as the Village Credit Institution (LPD), cooperatives, Farmers Group Association (Gapoktan) and Village Owned Enterprises (BUMDES).

The research location is in Punggul village, Badung, Bali Province. Badung Regency was chosen because it has already had regulations regarding the use of information technology in Regent Regulation 42/2019 regarding the Smart City development master plan. One of the villages that has utilized information technology for data collection and public services is Punggul village. Punggul Village offers 6 guarantee programs to provide public services to village communities, namely (1) Internet Connection Guarantee, this guarantee is intended for elementary to high school students who take part in online teaching and learning activities. The village government provides a wireless internet connection (Wi-Fi) to residents' homes. (2) Population data validation guarantee ensures that all community data has been recorded only by filling in the NIK and KTP, village communities only need to access the Population Administration Information System (SIAK). In addition, population data management services do not need to queue; village communities simply access the application, Village and Village Administration System. (3) Human Resources Guarantee, this guarantee guarantees that all village officials are able to operate computers. (4) Village Archive Guarantee, all correspondence managed by the village government will be archived electronically, so that the filing is neatly organized. (5) Guarantee of Completeness of Village Land Administration, this guarantee is supported by the Klik Tanahku application in an effort to reduce land disputes in the event that all existing land parcels must be recorded. Through this application, village communities can view information related to tax object numbers, taxpayer names, NIK, field identity numbers, land status and district status. (6) Economic guarantee is supported by the people's market application, which can be used by the public for purchases such as Tokopedia and others. All harvests in the community can be marketed through the people's market application coordinated by the Punggul BUMDes. Up to now, there are 50 types of goods that are encouraged to be digitalized and enter the online market.

The local government discovers some strategies to enhance digital economy. First, develop digital platform for village market and business. Second, involve Pendamping Desa (local facilitator) to encourage entrepreneurship to explore creation and innovation. Villages Featured Product (Produk Unggulan Desa) appears as a competitive product from local community. The village has to explore the potential and excellent products that have uniqueness and character. The process can be implemented through identifying and mapping the potential and excellent products in the village. Identification and analysis of village potentials is indispensable to know the potential and as a framework of reference in the development of digital economy of the village. Villages Featured Products are available from agriculture, plantation, handicraft and services.

During 2019, Punggul village received approximately 400 visits. A visit related to the study of digital villages. The local government is aware that the visits brought positive impacts and wider opportunities. The village of Punggul built a digital learning space tour in the village and cooperation with the nearby villages in developing tourism. Development of village tourism education will involve institutional and village community. For example, the women group will be involved to provide village souvenirs and culinary. Furthermore, the youth are involved in managing the attraction and tourist destinations in the village.

The character of tourism was developed through identifying tourism potential. The local governments develop a scheme of tourism that consists of nature tourism and digital education tourism. Punggul Village preserves traditional buildings and spaces as locations of tourism activities. The Punggul village government develops a road map and plans the tourism services. The education tourism aspires from the digital transformation practice of the village. This effort was triggered from many visits from the another province government and institution, universities and organization to learn about Punggul digital transformation. Local government representatives came from area of Bali, Java and Sumatera.

The Punggul village government attempted to bridge stakeholders' cooperation. The development of tourism is sought to build a network between villages. The inter-village network is expanded for mutual cooperation. Furthermore, Punggul Village built a network with nearby villages to be involved in the development of shared tours. The development of a shared tourism networking is well received by the community. For instance, digital marketing became media to promote guest houses, local souvenirs and typical village products of village tourism. Digital development is also implemented through the use of websites and applications for travel promotion and cooperation opportunities with the third parties.

In addition, Punggul Village established village-owned enterprises (Badan Usaha Milik Desa) to manage economy opportunity in line with the utilization of information, communication, and technology (ICT). The village government supports the adoption of ICT and encourages innovative digital economy through village-owned enterprises. Village-owned enterprises organize several business unit integrated with digital platform namely PEKEN ONLINE and 3R (recycle, reuse, reduce) management of waste. The village government provides PEKEN ONLINE application as digital marketing that accommodate village product and ease consumer in the village to purchase agriculture product in Covid-19 pandemic. Besides PEKEN ONLINE, village-owned enterprises bussines unit also prepares the 3R (recycle, reuse, reduce) waste management using digital media and application.

Village-Owned Enterprises and Villages Featured Product can be utilized as a digital economy platform. Punggul Village is in progress to develop the program innovation for village-owned enterprises business unit. The business that will be developed is in line with the plan improvement of digital transformation in the village. Then, villages featured product from Punggul Village will be developed specifically related to the typical handicrafts and tourism. The village-owned enterprises and villages featured product development strategies are designed to involve community group such as women and youth. The important thing to note later is to build an integrated system of administrative and financial record and facilitate community to conduct business processes.

The next strategy is to drive the role of Pendamping Desa or village assistance as community development facilitator. Village assistance is necessary to empower community in the village through many kinds of action. Village assistance is supposed to involve community in managing village economy potential. Involvement of village assistance can leverage the users of digital media and begin to arrange a road map dan planning.

CONCLUSION

Digital economy has been developed through the village policy and has increased its benefit during pandemic. The digital development brings effective services for community assistances during pandemic in line with economy opportunity. The local policy strategy in Punggul Village is implemented through increasing significant aspects. First, digital infrastructure is basic facilities to give equal access for community. Second, digital ecosystem is necessary to develop especially digital literacy and skill. Digital ecosystem is important because the successful development of the digital economy relies on the literacy and capacity of the human resources. Human resources have to adjust to the presence of the digital economy and mitigate the negative impacts of the digital adoption in the village.

In addition, the village requires improvement and ability to identify and promote the featured products and cooperate with diverse stakeholders. Furthermore, the roadmap of digital economy development should accommodate the community needs inclusively. This is important because the users of digital development in the village are not only the village government but also the village community. The cooperation from local level to regional government is also an important stage linked to policy framework. The development of the digital economy is expected to provide access for rural community to actively participate in the development and increase community knowledge, skill and awareness of economy opportunity.

CONTRIBUTORSHIP

Febrina Elia Nababan and Dian Karinawati Imron are the main authors. Febrina Elia Nababan and Dian Karinawati Imron have equal contributions to the design and implementation of the research, to the analysis of the results and to the writing of the manuscript.

BIBLIOGRAPHY

- Agarwal, R. (2020). *Digital Transformation: A Path to Economic and Societal Value Digital Transformation : A Path to Economic and Societal Value*. 6(12).
- APJII. (2017). Penetrasi & Profil Perilaku Pengguna Internet Indonesia. *Apjii*, 51. www.apjii.or.id.
- Bukht, R., & Heeks, R. (2018). Development Implications of Digital Economies. *Centre for Development Informatics*, 6, 23. <https://doi.org/10.13140/RG.2.2.11124.09602>.
- Dannenberg, P., Fuchs, M., Riedler, T., & Wiedemann, C. (2020). Digital Transition by COVID-19 Pandemic? The German Food Online Retail. *Tijdschrift Voor Economische En Sociale Geografie*, 111(3), 543–560. <https://doi.org/10.1111/tesg.12453>.
- European Commission DESI 2016, Digital Economy and Society Index. Methodological Note. Available online: <http://ec.europa.eu/dae> (accessed on 24 April 2022).
- Guo, H., Liu, Z., Jiang, H., Wang, C., Liu, J., & Liang, D. (2017). Big Earth Data: a new challenge and opportunity for Digital Earth's development. *International Journal of Digital Earth*, 10(1), 1–12. <https://doi.org/10.1080/17538947.2016.1264490>.
- Hadi, A. (2018). Bridging Indonesia's Digital Divide: Rural-Urban Linkages? *Jurnal Ilmu Sosial Dan Ilmu Politik*, 22(1), 17. <https://doi.org/10.22146/jsp.31835>.
- Haryanti, S., & Rusfian, E. Z. (2019). Government Public Relations and Social Media: Bridging the Digital Divide on People with Social Welfare Problems. *JKAP (Jurnal Kebijakan Dan Administrasi Publik)*, 22(2), 128. <https://doi.org/10.22146/jkap.34602>.
- Kilpeläinen, A., & Seppänen, M. (2014). Information technology and everyday life in ageing rural villages. *Journal of Rural Studies*, 33, 1–8. <https://doi.org/10.1016/j.jrurstud.2013.10.005>.
- Lusardi, A. (2019). *Financial literacy and the need for financial education: evidence and implications*. 5, 1–8.
- Malladi, C. M., Soni, R. K., & Srinivasan, S. (2021). Digital financial inclusion: next frontiers — challenges and opportunities. *CSI Transactions on ICT*, 9(2), 127–134. <https://doi.org/10.1007/s40012-021-00328-5>.
- Moleong, Lexy J. (2016). *Metode Penelitian Kualitatif. Edisi Revisi*. Bandung: PT. Remaja Rosdakarya.
- Moriset, B. (2010). *Developing the digital economy in France's rural regions: A new era for telecenters?*
- Oktavia, R., & Wihastuti, L. (2020). Village Fund and Poverty Alleviation in Kulon Progo Regency. *Jurnal Kebijakan dan Administrasi Publik*, 24(1), 2020. <https://jurnal.ugm.ac.id/jkap/article/view/43237>.
- Onitsuka, K., Hidayat, A. R. R. T., & Huang, W. (2018). Challenges for the next level of digital divide in rural Indonesian communities. *Electronic Journal of Information Systems in Developing Countries*, 84(2), 1–25. <https://doi.org/10.1002/isd2.12021>.
- Peña, D. N., Raúl, V., Ruiz, L., Luis, J., Navarro, A., & Peña, D. N. (2019). Information Technology for Development An analysis of the key role of human and technological development in the smart specialization of smart European regions. *Information Technology for Development*, 0(0), 1–14. <https://doi.org/10.1080/02681102.2019.1704675>.
- Philip, L., Cottrill, C., Farrington, J., Williams, F., & Ashmore, F. (2017). The digital divide: Patterns, policy and scenarios for connecting the 'final few' in rural communities across Great Britain. *Journal of Rural Studies*, 54, 386–398. <https://doi.org/10.1016/j.jrurstud.2016.12.002>.
- Podgorskaya, S., & Schitov, S. (2020). *Model for assessing the competitiveness of rural areas in the region in the new economic conditions*. 14001.
- Salemink, K., Strijker, D., & Bosworth, G. (2015). Rural development in the digital age : A systematic literature review on unequal ICT availability , adoption , and use in rural areas. *Journal of Rural Studies*. <https://doi.org/10.1016/j.jrurstud.2015.09.001>.

- Silva, H. C., & Silva, H. C. (2015). *Technology, skills and job separation*.
- Skerratt, S. (2010). Hot spots and not spots: Addressing infrastructure and service provision through combined approaches in rural Scotland. *Sustainability*, 2(6), 1719–1741. <https://doi.org/10.3390/su2061719>.
- Skerratt, S. (2014). *Hot Spots and Not Spots: Addressing Infrastructure and Service Provision through Combined Approaches in Rural Scotland*. June 2010. <https://doi.org/10.3390/su2061719>.
- Sugiyono. 2015. *Memahami Penelitian Kualitatif*. Bandung: Alfabeta.
- Sulistiyowati, F., MC Dibyorini, R., & Tyas, B. H. (2017). Pelembagaan partisipasi masyarakat sebagai upaya implementasi sistem informasi desa. *Jurnal ASPIKOM*, 3(2), 215–224.
- Townsend, L., & Fairhurst, G. (2013). *Enhanced broadband access as a solution to the social and economic problems of the rural digital divide*. <https://doi.org/10.1177/0269094213496974>.
- Wallace, C. (2012). *Can Information and Communications Technology Enhance Social Quality?* 2(2), 98–117. <https://doi.org/10.3167/IJSQ.2012.020207>.
- Wallace, C. (2013). *Can Information and Communications Technology Enhance Social Quality?* *International Journal of Social Quality*, 2(2). <https://doi.org/10.3167/ijsq.2012.020207>.
- WEF. (2015). *WEFUSA Digital Infrastructure Report 2015*. March.
- Yulizar, I., Jörg, M., Aldea, A., Govindaraju, R., & Iacob, M. E. (2022). Rural smartness: Its determinants and impacts on rural economic welfare. *Electronic Markets*. <https://doi.org/10.1007/s12525-022-00526-2>.