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### Digitalizing Rural Development in Indonesia: Unveiling Concepts and Strategies for Building Sustainable Digital Villages

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#### Abstract

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*Digitalizing rural Indonesia can alter the quality of life and promote inclusive economic growth. This article discusses the importance of digital technology in rural areas, highlighting the impact of the Fourth Industrial Revolution and the COVID-19 epidemic on human behavior and the significance of ICT in modern communal life. The report emphasizes the necessity for reliable infrastructure, particularly internet networks and related technologies, to adopt ICT in rural areas. The qualitative study examines the urgency, characteristics, and growth methods of digital villages in Indonesia using current literature, official reports, and academic papers. A digital village development approach emphasizes interconnectedness, collaborative capacity building, digital integration benefits, and growth. The study examines Indonesia's digital village potential in farming, plantations, aquaculture, animal husbandry, travel, and hospitality. After examining the pros and cons of digital villages, the article emphasizes the need for a comprehensive program and policy to ensure rural digitization success. It offers practical solutions for using digital technology to overcome challenges and promote sustainable development in rural areas.*

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### INTRODUCTION

The Fourth Industrial Revolution (Industrial Revolution 4.0) and the Covid-19 epidemic have profoundly altered human behavior and cultural conventions. The significant changes are primarily driven by advancements in Information and Communication Technology (ICT) and the necessary implementation of social distancing measures to control the transmission of the COVID-19 virus (Nugroho et

al., 2020; Safitri et al., 2020). The result of these transformative events is a significant increase in internet users engaging in both formal and informal activities. ICT is essential in both urban and rural areas and plays a crucial role in defining modern communal life (Ihwanudin et al., 2023; Imani et al., 2023; Jihad et al., 2022).

However, the successful implementation of ICT relies on the presence of reliable infrastructure, which includes internet networks, computer hardware, cell phones, and related technologies (Simpson, 2020). The essence of this digital revolution is centered upon the concept of digitalization, which entails using information and communication technology (ICT) across a wide range of digital devices, from mobile phones to advanced computer systems. This paradigm shift enables the automation of processes and procedures previously performed manually, marking the beginning of a new era characterized by increased efficiency and creativity (Lindgren et al., 2019). Nevertheless, the expansion of this technological revolution to remote regions has complex obstacles, as expressed by (Cintamulya, 2015; Subiakto, 2013; Susanto et al., 1992) emphasize rural populations' widespread constraints, such as limited knowledge and skills, economic vulnerability, inadequate public health measures, limited financial opportunities, and restricted channels for promoting local products.

Table 1. Cities in Indonesia

No	City	No	City	No	City
1	Bandung	10	Batam	19	Yogyakarta
2	Medan	11	Bandar Lampung	20	Pontianak
3	Bekasi	12	Malang	21	Jambi
4	Tangerang	13	Pekanbaru	22	Surakarta
5	Depok	14	Bogor	23	Manado
6	Semarang	15	Banjarmasin	24	Jakarta
7	Palembang	16	Samarinda	25	Padang
8	Makassar	17	Denpasar		
9	Surabaya	18	Balikpapan		

Source: (Santoso, 2009)

Table 2. Number of Villages in Indonesia

No	Provincial	No of Villages	City	Provincial	No of Villages
1	Central Java	8559	19	Jambi	1562
2	East Java	8496	20	Banten	1552
3	Aceh	6508	21	Bengkulu	1514
4	North Sumatera	6132	22	West Sumatera	1275
5	West Java	5957	23	Maluku	1240

6	Papua	5552	24	North Maluku	1196
7	East Nusa Tenggara	3353	25	West Nusa Tenggara	1143
8	South Sumatera	3262	26	East Kalimantan	1038
9	South Sulawesi	3049	27	Gorontalo	734
10	Lampung	2654	28	Bali	716
11	North Sulawesi	2354	29	Sulbar	650
12	West Kalimantan	2137	30	North Kalimantan	482
13	Central Sulawesi	2020	31	DI Yogyakarta	438
14	South Kalimantan	2008	32	Riau Islands	416
15	West Papua	1987	33	Bangka Belitung	391
16	Riau	1875	34	DKI Jakarta	267
17	North Sulawesi	1838			
18	Central Kalimantan	1576			

Source: (Kusnandar & Widowati, 2019)

The contextualization of digital infrastructure concerns becomes complex in Indonesia's archipelagic geography, where the number of rural areas exceeds that of metropolitan zones. (Santoso, 2009) states that Indonesia consists of 25 cities, as shown in Table 1. (Kusnandar & Widowati, 2019) report an impressive number of 83,931 villages spread throughout the archipelago, as indicated in Table 2. The interaction between urban and rural processes in the geographical landscape of Indonesia serves as the backdrop for the influence of two significant phenomena. First and foremost, the Fourth Industrial Revolution is causing substantial changes in the structure of everyday life, especially in the field of Information and Communication Technology (ICT). Furthermore, the COVID-19 pandemic has compelled communities to adopt innovative measures, particularly social distancing, leading them to depend more on digital technology for both official and casual engagements.

The consequences of these changes are seen in the increased internet utilization, including in remote rural areas. Nevertheless, achieving successful ICT deployment requires more than just using it more frequently—it requires a strong infrastructure consisting of internet networks, computer hardware, cell phones, and additional devices. The process of digitalization, which involves automating tasks that were formerly done manually, encounters numerous obstacles in rural locations. These hurdles include low knowledge among communities, economic restraints, inadequate healthcare, and restricted access to financial services and local product markets. The difficulties of rural infrastructure challenges are further accentuated by Indonesia's archipelagic nature, which is characterized by a more significant number of villages compared to cities.

Against this complex background, the challenges this conceptual paper formulates become clear in three main questions:

- What is the imperative behind the implementation of digital technology in rural areas?
- What are the defining characteristics of digital villages in Indonesia?
- What strategies can be employed to promote the establishment of digital villages in Indonesia?

The problem formulations outlined here serve as the foundation for the aims of this conceptual work, which include:

- To get a comprehensive comprehension of the pressing nature of rural digitization.
- To decipher the distinct attributes that define digital communities in Indonesia.
- To clarify the mechanisms that promote the growth of digital villages in Indonesia.

This conceptual work has far-reaching ramifications that go beyond academic discussions. It provides deep insights into the development of villages and the crucial role of digitalization in rural areas in Indonesia. This conceptual paper aims to provide practical solutions for using digital technology to overcome problems and promote development in rural areas.

## **RESEARCH METHODS**

This study examined Indonesian digital communities' urgency, characteristics, and growth methods using a qualitative approach and literature review as well as secondary data analysis. The qualitative approach sought to comprehend rural digitization's complex social phenomena, including challenges, opportunities, and repercussions. Current literature, official reports, and academic papers on rural digitization, ICT applications, and socio-economic factors affecting rural communities were examined to answer the research questions and objectives. Case studies and examples were used to show rural Indonesians' real-life struggles.

The research technique also compared rural and urban locations to highlight digital village problems. This comparative analysis compared digital infrastructure, resource accessibility, and socio-economic indicators in both contexts to highlight rural digitization's distinct needs and opportunities. The perspective of government officials, community leaders, and technological specialists was combined to ensure a complete picture. The qualitative method and comparative analysis helped researchers comprehend the study topic and generate practical policy and decision-making recommendations. The qualitative research, literature review, and comparative analysis study provided valuable insights and recommendations to promote rural digitization and ICT deployment in rural communities (Napitupulu et al., n.d.; Oktris et al., 2022). To meet its goals, the conceptual paper used a

descriptive qualitative approach to answer research questions about the urgency, characteristics, and development of Indonesia's digital villages.

## **RESULT AND DISCUSSION**

### **Urgency of Rural Digitalization**

The Indonesian government is faced with the challenging challenge of improving rural infrastructure in order to enable easy access to information and smooth execution of transactions in rural areas. The fundamental strategy for tackling this difficulty is embodied in the notion of rural digitization, a complex process aimed at improving the quality of life for people living in distant places through the use of digital Information and Communication Technologies (ICT). The diverse goals of rural digitization go beyond the economic aspect and also include improving health and education, leading to an overall enhancement of the community's well-being.

Zerrer and Sept's seminal work of 2020 argues that rural digitization is the tangible implementation of digital social innovation. This paradigm shift symbolizes a unique type of social innovation and collaborative effort that originates at the local level. In this process, rural communities strategically use digital technology to create knowledge-based products or services collectively. These creative initiatives are customized solutions created to address the specific needs of rural communities (Gómez-Carmona et al., 2023; Zerrer & Sept, 2020). Essentially, rural digitalization is a collaborative effort by rural communities to activate the untapped potentials present in their areas.

The core principle of rural digitization is its ability to empower several aspects inside rural areas, including natural resources, human resources, production factors, and knowledge repositories. Rural communities aim to overcome the inherent limits that have historically hindered progress in these locations by implementing digital technology as a catalyst for transformation. The deliberate use of digital tools serves as a means for rural communities not only to overcome current obstacles but also harness and maximise the inherent capabilities of their environment.

### **Character of Digital Villages in Indonesia**

Rural areas, commonly associated with isolated locations, are distinguished by restricted information accessibility, making them ideal candidates for digital transformation. The widespread availability of internet networks is the crucial element in enabling and empowering rural communities to become digitally savvy entities. According to Fakhri (2019), the Minister of Communication and Information Technology, Rudiantara, stated that 82.36% of rural areas in Indonesia have been connected to the Internet. This includes a total of 69,126 villages, as shown in Table 2. However, the combination of the internet and digital technology requires a solid understanding and proficiency to achieve specific goals, particularly in improving the

well-being of rural communities (Nugroho, 2023; Nugroho & Chowdhury, 2015; Tømte & Hatlevik, 2011).

A significant obstacle hindering the efficient use of internet networks and digital technologies in rural areas of Indonesia is the widespread low level of knowledge among these groups (Choerudin et al., 2023; Vito & Krisnani, 2015). Significantly, the current Covid-19 outbreak has prompted the government to accelerate the development of internet networks in all Indonesian villages to promote remote learning under health guidelines. Merely providing infrastructure does not guarantee efficient utilization. In order to fully harness the capabilities of digital technology and the internet, it is crucial to make focused and collaborative endeavors.

Initially, it is essential for local governments to take the lead in organising socialisation and training programmes by appointing individuals who can drive and facilitate change. These individuals would have the responsibility of teaching vital skills and knowledge to village populations, explaining how to effectively use digital technology and the internet for beneficial reasons. Furthermore, local village administrations can foster an increase in the consciousness and creative capabilities of village communities by organising competitive events. These competitions would act as catalysts for creativity, with the winning ideas then being adopted to enhance the productivity of these settlements.

To illustrate the difficulties encountered by local products in rural areas, particularly due to limited knowledge that hampers effective marketing, we can examine how coffee producers in Wonosalam, Jombang, East Java, successfully overcame these challenges to promote their exelsa coffee. The origin of exelsa coffee can be traced back to the construction of coffee plantations during the Dutch colonial era. This coffee product distinguishes itself with its exceptional flavour, surpassing both arabica and robusta coffee in terms of its distinctive taste and potent aroma. Nevertheless, a study carried out by Setya Yunas in 2019 revealed the existence of obstacles in the branding and marketing of Exelsa coffee, hindering its ability to compete effectively with other coffee varieties.

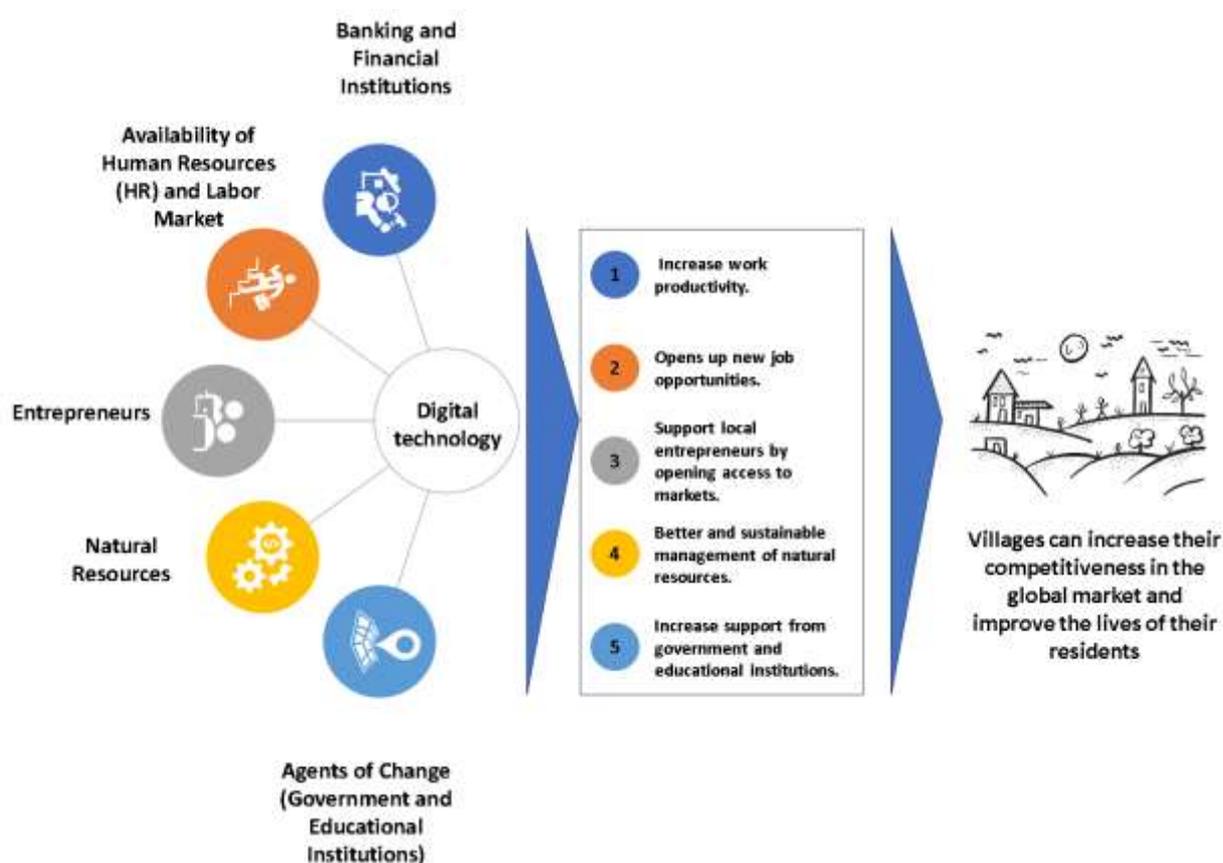
A digital social innovation arose as a solution to this issue within the exelsa coffee-producing community. A practical approach entails establishing a digital community that utilizes social media and internet networks to promote and sell their items. This method enables companies to not only expand their market reach but also overcome the knowledge constraints associated with traditional marketing. In addition, the marketing methods can be strengthened by cultivating a favorable reputation for Exelsa coffee. An efficient approach is to employ social media sites, specifically Instagram, where consumers may disseminate their product experiences. The dissemination of positive evaluations and visually appealing photographs of exelsa coffee can trigger a chain reaction in marketing, sometimes referred to as *getok tular* or "word of mouth marketing." By incorporating digital social innovation, online community development, and reputation enhancement through social media, exelsa coffee producers in Wonosalam have effectively surmounted

marketing challenges and enhanced the prominence and competitiveness of their local products in the broader market.

### Digital Village Development Model in Indonesia

The digital transformation of villages in Indonesia is shaped by a specific configuration or paradigm that varies in each location, influenced by the unique combination of natural and human resources found in each village. However, a general plan for the development of digital infrastructure in rural areas can be outlined, as shown in Figure 1, provided by the author.

Figure 1. Village Digitalization Model



Source: Author

Referring to the figure above (Figure 1), the explanation of the digital village model can be described through the following statements:

- Banking and financial institutions: Digital villages can have better access to banking and financial services through technologies such as online banking and electronic payment devices.

- Availability of Human Resources (HR) and Labor Market: Digital villages can create employment opportunities by connecting residents to online job opportunities or through technology-enhanced training and skills development.
- Entrepreneurs: Digital villages foster business growth by facilitating access to online marketplaces, technology support for local entrepreneurs, and the resources needed to start and grow a business.
- Natural Resources: The use of technology and data can assist in more efficient and sustainable management of existing natural resources in the village, such as agriculture, forestry, or water resources.
- Agents of Change (Government and Educational Institutions): Governments and educational institutions can act as agents of change by providing the technological infrastructure, training, and policy support needed to transform villages into digital villages.

Digital villages aim to improve the quality of life of their residents, create economic opportunities, and improve access to essential services through the utilization of information and communication technology. Furthermore, connecting villages with various aspects such as banking, human resources, labor markets, entrepreneurs, natural resources, and agents of change such as government and educational institutions can have a positive impact on the village economy. Here are some of the positive impacts that can occur:

- Increase work productivity: With access to information and communication technologies, as well as appropriate training, villagers can improve their work productivity. For example, farmers can utilize technology to monitor the weather, manage supplies, and plan their crops more efficiently.
- Opens up new job opportunities: Integration with the wider labor market, especially through internet access, can open up new employment opportunities. It can create jobs in sectors such as outsourcing, online customer service, software development and more.
- Support local entrepreneurs by opening access to markets: Digital villages can support local entrepreneurs by providing access to broader markets, training, and resources such as business financing. This can drive local business growth and create new opportunities.
- Better and sustainable management of natural resources: Technology can help in better and sustainable management of natural resources. It can increase the production output of the agriculture, fisheries and forestry sectors, which in turn can increase the income of villagers.
- Increase support from government and educational institutions: Governments and educational institutions can provide support in the form of technology infrastructure, training, and policies that support the digital transformation of villages. This can accelerate economic development in the region.

To summarise, the digital village concept, as illustrated in Figure 1, appears as a complex network of interconnections and cooperative endeavours. The design, if followed with great attention to detail, has the capacity to bring about a new era of

economic prosperity and societal welfare in the varied Indonesian village landscape. Overall, digital villages can be a catalyst for local economic growth by opening up access to resources and opportunities that were previously hard to reach. By utilizing available technologies and connections, villages can increase their competitiveness in the global market and improve the lives of their residents.

### **Potential for Digital Village Development in Indonesia**

Indonesia, known for its plentiful natural riches, is on the verge of a significant change with the implementation of digital village initiatives. The untapped potential is not just in the abundance of its natural resources, but also in the strategic use of these assets through cutting-edge digital technologies. The prudent administration and fair allocation of these resources, enabled by digital platforms, have the potential to generate significant additional value for the Indonesian population. By incorporating state-of-the-art technologies in agriculture, plantations, cattle, and fisheries, Indonesia can strategically progress towards achieving developed nation status with a strong agricultural base, hence diminishing its dependence on external suppliers for vital commodities.

In this transition towards the establishment of digital villages, the focus is on understanding and enhancing the inherent benefits found in rural areas. The main objective of the project is to recognise and utilise the existing resources in the local area, in order to enhance their worth and make them strong foundations for the development of the communities. This transformation not only improves the economic environment but also empowers the villages to have a crucial role in the larger national development story.

Given Indonesia's status as one of the most populous countries globally, a fundamental reorientation is necessary. The emphasis should be redirected towards self-reliance through the empowerment of the native population. Indonesia faces the risk of becoming merely a vast market for foreign goods and services, so compromising its economic independence, if it fails to implement a well-designed plan for empowering its own industries. The path to achieving independence requires a thorough strategy that empowers and harnesses the inherent potential of the local populations. Crucial industries in rural areas identified for the incorporation of digital technology encompass:

- **Agriculture Industry:** The agriculture sector, acknowledged as the primary driver of Indonesia's economic expansion, warrants particular focus. Despite the problems presented by the COVID-19 epidemic, agriculture proved to be a resilient force in preserving economic stability. Utilizing digital solutions can optimize agricultural practices, thereby ensuring long-term productivity and improving the overall efficiency of the sector (Isbah & Iyan, 2016).
- **Plantation Sector:** The plantation sector, which is another crucial aspect of national economic development, requires careful and detailed attention. To enhance the quality of plantation commodities, a comprehensive strategy is

necessary, which includes several aspects such as choosing superior seeds, implementing sophisticated packaging and marketing methods, and utilizing digital technologies (Hamim & Vianda, 2019).

- **Aquaculture and Animal Husbandry Sector:** Indonesia's extensive ocean area makes the fishing sector a crucial driver of economic expansion. The process of digitalization is crucial for improving the quality of processed fish and optimizing marketing tactics for both domestic and international markets (Komninos et al., 2021). The rural digitization efforts should prioritize the livestock industry, aiming to achieve excellent outcomes that can meet the growing demand for animal-based food. This would have a favorable influence on public health and productivity (Morrone et al., 2022).
- **Travel and hospitality industry:** In addition to its abundant natural resources, Indonesia possesses a vast array of natural splendour, highlighting the potential for a prosperous tourism industry. The incorporation of digital technologies plays a crucial role in the advancement of not just tourism but also its related sub-industries, such as the creative economy. This strategic merger holds the potential to generate new opportunities for economic expansion and cultural interchange (Bakker & Bridge, 2006; Mudrikah et al., 2014).

The process of developing digital villages in Indonesia can be described as a complex interplay between local resources, technology advancements, and economic empowerment. As these strands interconnect, a story of self-reliance and national economic success starts to emerge, placing Indonesia on the verge of a significant period of change.

### **Advantages and Disadvantages of Digital Villages**

Implementing a thorough program and policy surely results in a range of both beneficial and detrimental consequences. In the realm of village digitization, which aims to improve the quality of life for those living in rural areas, there are several advantages and disadvantages to consider. Examining the negative elements, the following problems deserve careful consideration:

- **Rapid increase in digital-based criminal activities:** The incorporation of digital technologies in rural areas may unintentionally facilitate a significant increase in cybercrime (Jainuri et al., 2023). The susceptibility of these digitally transformed communities to different types of digital wrongdoing presents a substantial obstacle to the overall objective of societal improvement (Saputra et al., 2023).
- **Rise of social issues arising from the improper utilisation of digital technology:** Another significant disadvantage is the possibility of digital technology being misused or mismanaged, leading to social issues. These difficulties may encompass problems like over reliance on digital technology, online harassment, or the spread of false information, therefore undermining the

expected beneficial effects of the digitalization initiative (Trittin-Ulbrich et al., 2021).

- Significant capital expenditures for digital infrastructure: A fundamental difficulty in carrying out digital programmes is the significant financial commitment needed to obtain and sustain the necessary technological infrastructure. If these investments are not optimised, it may lead to a disproportionate strain on resources without corresponding advantages (Kwasny & Keil, 2006).

On the other hand, the benefits resulting from the rural digitization programme are as remarkable, covering a wide range of revolutionary results:

- Enhanced knowledge and proficiency within rural communities: plays a crucial role in equipping rural communities with the necessary knowledge and skills to effectively utilise digital technologies. This enables them to utilise these technologies effectively for the growth of their enterprises, thereby promoting a culture of creativity and flexibility.
- Enhanced well-being of rural communities: Digitalization has a comprehensive influence on the overall welfare of rural areas. By utilising digital resources, these communities can obtain information, services, and opportunities that enhance their quality of life, well-being, and education.
- Increased Proficiencies of Rural Businesses: The digitalization programme enhances the capacities of rural enterprises in multiple areas, including as production, marketing, reputation management, and financial operations. This empowerment enables small enterprises to participate effectively in national and global markets, promoting economic strength and long-term viability.

Ultimately, introducing a village digitalization program presents a complex array of benefits and drawbacks. It is crucial to find a careful equilibrium between reducing the recognized disadvantages and maximizing the advantages to guarantee these revolutionary projects' triumph and long-term viability in society. businesses.

## **CONCLUSION**

The process of digitizing rural areas in Indonesia is a complex and varied endeavor that requires a comprehensive comprehension of each hamlet's unique obstacles and possibilities. Through proactive measures and using digital technology capabilities, Indonesia has the opportunity to establish sustainable digital villages, which will enhance the welfare of rural communities and make a substantial contribution to the country's economic progress. To undergo this transformative process, it is essential to adopt a concentrated attitude towards four crucial aspects:

- The successful integration of digital technology in rural areas requires seamless communication between natural resources, profitable enterprises, human

talents, workforce, and financial institutions. This interconnection serves as a catalyst for cultivating a flourishing digital ecosystem within the community.

- Collaborative Capacity Building: The involvement of change catalysts, practitioners, local governing bodies, and academia is crucial for improving digital literacy and competency in the village community. These collaborative efforts are crucial in advocating for the intelligent and efficient utilization of pertinent digital technology.
- Benefits of Digital Integration: The wise utilization of digital technology can result in several advantages, such as bolstered marketing skills, improved business reputation, heightened efficiency, and expanded access to financial resources. These improvements promote the productivity of small-scale entrepreneurs in rural areas, promoting economic development.
- Economic Catalyst: The establishment of digital villages serves as a stimulus for economic growth and increased productivity in rural regions. By utilising digital technology, we can create a collaborative and mutually advantageous business environment that promotes the development of wealth in the community while also improving the well-being of its citizens.

The digitalization of rural areas in Indonesia has the potential to significantly improve the standard of living for rural communities and contribute to inclusive economic growth. Indonesia can strategically utilize digitalization to assist rural areas despite low knowledge, economic weaknesses, and healthcare limitations. This transformative journey involves the development of collaborative capability, interrelated components, the benefits of digital integration, and growth stimulation. It places rural communities as active contributors to Indonesia's development story. To ensure the long-term success of Indonesia's rural digitization programs and create a solid and adaptable digital environment, it is crucial to manage the obstacles and opportunities carefully.

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