







Enterprise Architecture Model for Digital Village in West Java Province

Hari Supriadi¹, Yudi Wibawa², Agus Rahayu³
and Lili Adi Wibowo⁴

¹²³⁴ Universitas Pendidikan Indonesia, Bandung 40154, Indonesia
hari.supriadi@upi.edu

Abstract. This paper examines the utilization of the Enterprise Architecture Framework (EAP) in the creation of digital villages. The aim is to enhance coordination and integration among various development initiatives in the village. The method employed in this study is a Systematic Literature Review. The research findings demonstrate that the implementation of the enterprise architecture model in digital villages provides several benefits, including: (1) Digital villages are a novel concept in digital transformation that aims to improve the welfare of the community through the deployment of information and communication technology (ICT) in government management, public services, and community empowerment. (2) Enterprise architecture (EA) is a systematic and comprehensive approach to the planning, development, and management of information systems and technology in an organization. (3) The implementation of Enterprise Architecture (EA) can facilitate the design of digital villages in a way that ensures the integration and coordination of all system components and technology infrastructure, resulting in more efficient and effective public services. This research contributes to the advancement of theoretical studies on the Model of Digital Village Enterprise Architecture.

Keywords: Digital Villages, Enterprise Architecture, Information and Communication Technology (ICT).

1 Introduction

1.1 The development of Digital Villages

The development of Digital Villages has become a primary focus for many countries, including Indonesia, with the aim of improving the quality of life and increasing access to technology for rural communities. However, the development of Digital Villages is not a straightforward process and may require a systematic approach. One such approach is Enterprise Architecture (EA), which can help ensure that the technological infrastructure is integrated and provides greater benefits to rural communities.

1.2 Main Problem and Data

Digital village is a concept where information and communication technology (ICT) is employed to enhance the quality of life and governance in rural areas. Conversely, e-Government refers to the utilization of ICT in providing improved and more efficient public services. In this context, the application of enterprise architecture (EA) is crucial in formulating integrated strategies to achieve these objectives. EA can also aid in the expedition of decision-making processes, decrease costs and risks, and improve the productivity and efficiency of government and community in smart villages, as stated by [1].

1.3 Several Previous Studies

Several previous studies have discussed the development of Digital Villages using the EA approach. [2] proposed an EA model that can be used in the development of Digital Villages in Indonesia. The model consists of four layers: business, application, data, and information technology. [3] stated that the development of digital villages can enhance the efficiency and effectiveness of digital village development programs. EA can also assist the government in making strategic decisions and ensuring that policies and practices implemented align with the established goals and vision.

1.4 Research Goals

This literature review will delve into the concept of Digital Villages, examining the various Electronic Agent (EA) models proposed by previous researchers. Furthermore, it will also explore the challenges and key factors that must be considered when implementing the EA model for Digital Village development in Indonesia. Additionally, this study will address the critical importance of accounting for social and cultural factors in the implementation of the EA model for Digital Villages. Through this comprehensive analysis, it is anticipated that this literature review will provide a deeper understanding of the development of Digital Villages utilizing the EA approach and offer more informed recommendations for future Digital Village development.

2 Methods

We hereby present a formal review of the core subjects that have been the focal point of previous investigations on the Digital Village Enterprise Architecture Model. This endeavor serves as a foundation for contrasting the primary themes of modifications in the ongoing digital transformation phase, which we will delineate, including:

2.1 Enterprise Architecture

The Open Group Architecture Framework (TOGAF) defines "enterprise architecture" as a framework and approach for systematically and comprehensively planning, developing, and managing the architecture of an organization [4]. The Federal Enterprise Architecture Framework (FEAF) defines "enterprise architecture" as a practice used to govern and facilitate organizational change through the development and

implementation of an integrated architecture. (Office of Management and Budget. (2013), Federal Enterprise Architecture Framework, Version 2).

Gartner Group states that "enterprise architecture" is a practice used to optimize the relationship between business processes and information technology within an organization. The MIT Center for Information Systems Research (CISR) defines "enterprise architecture" as a framework for integrating information technology and business processes within an organization to achieve competitive advantage [5].

2.2 Digital Village

The Republic of Indonesia's Ministry of Communication and Information Technology (MCIT) formally characterizes a "digital village" as a settlement that has internet access, operates information technology systems, and leverages these technologies to enhance the standard of living and quality of public services [6]. The International Telecommunication Union (ITU) defines "digital village" as an area that has been technologically enhanced and has better access to technology and information infrastructure. [7].

The Gyeonggi Provincial Government (Korea) states that a "digital village" is an area that utilizes information and communication technology (ICT) to improve the quality of life of the community, advance the economy, and enhance the efficiency of public services [8]. The method utilized in this publication is the Systematic Literature Review (SLR), which was developed by Kitchenham and Charters. The execution of the SLR involves a multitude of tasks, which can be categorized into three primary phases: planning the SLR, implementing the SLR, and reporting the SLR.

Table 1. Protokol SLR Kitchenham & Charters.

Planning Stage	Step 1: Identifying the need for a systematic review Step 2: Formulating focused research questions Step 3: Conducting a comprehensive search for relevant articles Step 4: Assessing selected articles Step 5: Identifying the data needed to answer research questions
Implementasi Stage	Step 6: Extracting data Step 7: Synthesizing the findings of the articles Step 8: Interpreting the results to determine their application
Reporting Stage	Step 9: Reporting the systematic review

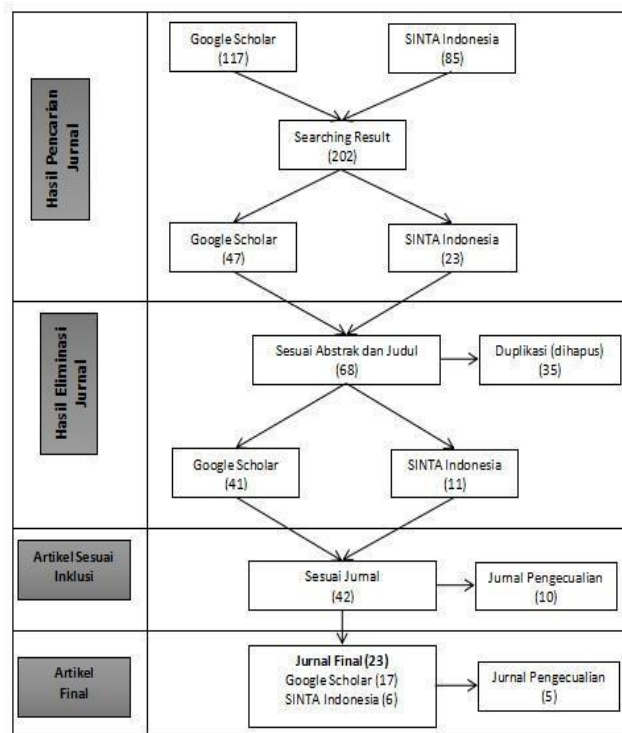
Table 2. Formulation of PICOC Questions

Population	Experts in Digitalization and Enterprise Architecture, Business Experts, Research Professionals, Village Government Officials, Labor Union Representatives.
Intervention	Our study was carried out by analyzing previous journals that had been published in reputable journals.
Comparison	-
Result	Enterprise Architecture Model on Digital Village
Context	Based on Enterprise Architecture and Social Culture of Digital Village

Table 3. Research Question

Research Question	Motivation
RQ1: The use of Enterprise Architecture in Digital Villages.	In this case, the researcher aims to identify which journals frequently discuss the topic of Enterprise Architecture in Digital Villages.

The process of searching for articles on Google Scholar and SINTA Indonesia commences next. The researcher restricts their search to articles with a SINTA reputation score of 1 to 5. The search criteria have been predetermined and include: adhering to the PICOC guidelines, aligning with the research questions, and identifying synonymous terms for the search. The keywords employed by the researcher during the article search phase are: Enterprise Architecture, Smart Village, Digital Village, and Information and Communication Technology (ICT) in Villages. The articles selected by the researcher were published between the years 2017 and 2023. For more information, please refer to **Fig. 1** below.

**Fig. 1.** Article search process

3 Result and Discussion

Based on the results of the identification of related articles, and the process of selecting articles, the following are the results and discussion of the literature review that was conducted

Table 4. Research Question

No	Journal Name	Number of Journals
1	Sustainability	4
2	ieeexplore	3
3	International Journal of Computer Applications	3
4	Iopscience	4
5	International Journal of Advanced Science and Technology	2
6	International Journal of Computer Science and Information Security	2
7	International Journal of Emerging Technologies and Innovative Research	2
8	International Journal of Information Management	1
9	International Journal of Engineering & Technology	1
10	International Journal of Innovation, Creativity and Change	1
11	International Journal of Business and Social Science	1
12	Journal of Information Systems Engineering and Business Intelligence	1
13	Journal of Information Technology and Economic Development	1
14	International Journal of Ambient Computing and Intelligence	1
15	International Journal of Advanced Computer Science and Applications	1
16	International Journal of Engineering and Advanced Technology	1
17	International Journal on Informatics Visualization	1

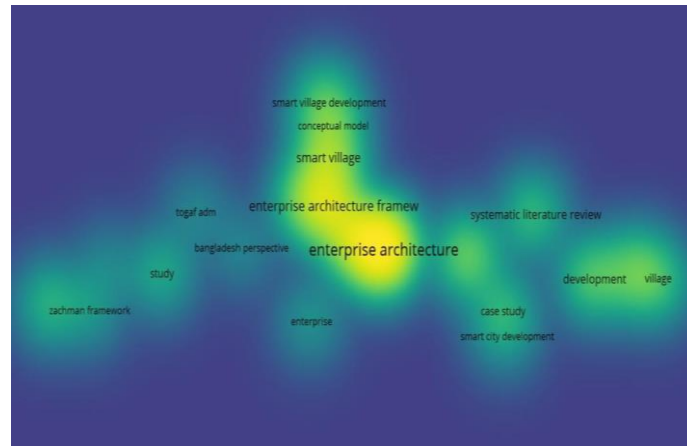


Fig. 2. The dynamic evolution of the co-citation network

Based on the table and figure above, the journal the highest number of publications discussing the Model Enterprise Architecture Smart Village is the Journal Sustainability (Q1), with 4 articles published between 2018 and 2023. This is important to note as it can serve as a reference for future researchers looking to publish articles related to the topic being studied. These journals can be chosen by future researchers if they wish to publish their articles. Among the 23 journals that discuss the Model Enterprise Architecture Smart Village, 17 are international journals and 6 are national journals. From the national journals found by the researcher, the majority of them still focus on the Model Enterprise Architecture Smart Village. Some research findings indicate that:

Main Theme 1: Enterprise Architecture (EA) plays a crucial role in the design of smart villages. By utilizing EA, a comprehensive and integrated plan can be developed to build the necessary information and communication technology (ICT) infrastructure for smart villages. EA takes into consideration all aspects of the process, including planning, analysis, design, implementation, management, and evaluation, in building the appropriate ICT infrastructure for smart villages. EA can also assist in the development of systems and applications needed for smart villages. In this regard, EA can help in building an integrated and flexible system architecture, facilitating the development of applications that can accommodate the needs of the community and village government. EA can also assist in determining standards and guidelines for building effective and efficient applications [9].

Main Theme 2 and Theme 5: Enterprise Architecture (EA) is a crucial strategy for achieving the e-government dimension in smart villages through the utilization of various frameworks. EA facilitates the integration of necessary information systems and technologies, thereby accelerating the digitalization of smart villages and e-government. In the context of smart villages, EA aids in the identification and establishment of an architecture comprising information technology components and supporting infrastructure for digital transformation within modern organizations. The EA approach is highly effective in supporting modern organizations in their digital transformation, enabling them to design and develop consistent and integrated information system

architectures with clear business goals, thus maximizing the benefits of information technology investments. With a well-defined architecture, the planning and implementation of smart village digitization initiatives can be more directed and effective.

The Open Group Architecture Framework (TOGAF) is a widely utilized and well-regarded enterprise architecture framework that can aid in the development of architectures that are both flexible and adaptable. These architectures are well-suited to addressing the environmental changes that may occur in smart villages, such as shifting needs and requirements.

The implementation of Electronic Access (EA) in smart villages has the potential to advance digitalization and optimize the utilization of information and communication technology to enhance the quality of e-government services provided to village residents. This, in turn, can foster active participation by citizens in decision-making and promote the development of smart villages [10,11].

Main Theme 3: The utilization of Enterprise Architecture (EA) as a means of promoting responsible urban digitalization can facilitate the development of a sustainable circular city. By integrating information and communication technology (ICT) with sustainability principles, EA can aid in the design of architectures that centralize, open, and structure data, and support interactions and collaborations among departments and organizations to achieve sustainability goals. EA can also help identify existing processes and systems and provide better mapping of available resources. This will help reduce expenses, accelerate problem-solving time, and enhance efficiency and productivity in city management [12].

Main Theme 4: Designing an applicable architecture for smart village development. Designing an architecture for smart village development involves several stages and aspects that need to be considered. Here are some steps that can be taken to design such an architecture (International Telecommunication Union (ITU), Building Smart Village A Blueprint): Study the needs and characteristics of the smart village: Before designing the architecture, a study needs to be conducted to understand the needs and characteristics of the smart village. This can be done through community meetings, surveys, or gathering data from various relevant sources.

Determine the goals and objectives of the smart village: After understanding the needs and characteristics of the smart village, the goals and objectives of the smart village that are to be achieved need to be determined. These goals and objectives should be aligned with the previously studied needs and characteristics of the smart village.

Design enterprise architecture: In designing the smart village architecture, consideration should be given to enterprise architecture, which includes business architecture, data architecture, application architecture, and information technology architecture. This enterprise architecture needs to be developed considering the goals and objectives set for the smart village. Determine the information technology infrastructure: After developing the enterprise architecture, the information technology infrastructure needed to support the architecture should be determined. This infrastructure includes hardware, software, networks, and data management systems.

Design and develop applications: Once the information technology infrastructure is determined, the development of applications that align with the enterprise architecture and the goals of the smart village needs to be carried out. These applications can include

mobile applications, web applications, and sensor-based applications. Implementation and testing: After the applications are developed, implementation and testing need to be conducted to ensure that the system functions well and aligns with the goals and objectives of the smart village[13]. Monitoring and evaluation: After implementation, regular monitoring and evaluation need to be carried out to ensure that the smart village can achieve the set goals and objectives. Designing an architecture for large-scale smart village development can be a complex challenge requiring careful considerations. However, by taking into account the mentioned stages and aspects above, it can help in designing an effective and efficient architecture for the smart village [7,14].

4 Conclusion

This paper presents a comprehensive overview of the Model of Digital Village Enterprise Architecture, while also offering a structured examination of the existing, yet scattered, body of literature on the subject. Our analysis identifies five principal themes of Digital Village Enterprise Architecture, which encompass both enduring topics that have been explored in previous research and emerging topics that have gained prominence in the study of Digital Village Enterprise Architecture. The Model of Digital Village Enterprise Architecture plays a pivotal role in the construction of an effective and efficient Digital Village. Research indicates that the utilization of the Enterprise Architecture model can aid in the planning, development, and management of efficient and effective information systems for rural communities. While the implementation of Digital Villages can bring substantial benefits, there still exist challenges and barriers that must be addressed in order to establish sustainable Digital Villages. As such, cooperation between the government, communities, and the private sector is crucial in the construction and maintenance of a Digital Village.

References

1. Ilham Alhari, M. & Nur Fajrillah, A. A. Enterprise Architecture: A Strategy to Achieve e-Government Dimension of Smart Village Using TOGAF ADM 9.2. *JOIV: International Journal on Informatics Visualization* **6**, 540 (2022).
2. Lankhorst, M. *Enterprise Architecture at Work Modelling, Communication and Analysis*. (Springer Link).
3. Kempegowda, S. M. Enterprise Architecture Driven Approach for Digital Transformation of Modern Organization . (University of Technology Sydney , 2018).
4. The TOGAF Library. the TOGAF® Standard, Version 9.2.
5. Ross, J. W., Weill, P. D. & Robertson, D. C. *Enterprise Architecture as Strategy — Creating a Foundation for Business Execution*. (HARVARD BUSINESS SCHOOL PRESS, 2006).
6. Herdiana, D. Pengembangan Konsep Smart Village Bagi Desa-Desa di Indonesia (Developing the Smart Village Concept for Indonesian Villages).

JURNAL IPTEK-KOM (JURNAL ILMU PENGETAHUAN DAN TEKNOLOGI KOMUNIKASI) **21**, (2019).

7. ITU. *Measuring Digital Development: Facts and Figures 2020*. (2020).
8. Ok, J. A. & Yoo, S. Directions and improvements of the future smart city development: a case of Gyenggi province. *Spatial Information Research* **25**, 281–292 (2017).
9. Agarwal, R., Thakur, V. & Chauhan, R. Enterprise Architecture for e-Government. in *Proceedings of the 10th International Conference on Theory and Practice of Electronic Governance* 47–55 (ACM, 2017). doi:10.1145/3047273.3047330.
10. Ilham, A., Munir, A., Ala, A. & Sulaiman, A. A. The smart village program challenges in supporting national food security through the implementation of agriculture 4.0. *IOP Conf Ser Earth Environ Sci* **1107**, 012097 (2022).
11. Anthony Jnr, B. Managing digital transformation of smart cities through enterprise architecture – a review and research agenda. *Enterp Inf Syst* **15**, 299–331 (2021).
12. Al-Nasrawi, S. & Ibrahim, M. An enterprise architecture mapping approach for realizing e-government. in *2013 Third International Conference on Communications and Information Technology (ICCIT)* 17–21 (IEEE, 2013). doi:10.1109/ICCITechnology.2013.6579515.
13. Mishbah, M., Purwandari, B. & Sensesuse, D. I. Systematic Review and Meta-Analysis of Proposed Smart Village Conceptual Model: Objectives, Strategies, Dimensions, and Foundations. in *2018 International Conference on Information Technology Systems and Innovation (ICITSI)* 127–133 (IEEE, 2018). doi:10.1109/ICITSI.2018.8696029.
14. Thirasakthana, M. & Kiattisin, S. Sustainable Government Enterprise Architecture Framework. *Sustainability* **13**, 879 (2021).

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

