

Identifying Platforms and Methods in the Development of Geographic Information Systems (GIS) in Indonesia: Systematic Literature Review

¹Muhammad Naufal Zulfikar, ²Kaila Yusri Salsabilla, ³Daffa Fadhilah Al Hafizh, ⁴Fitroh

^{1,2,3,4} Department of Information Systems Syarif Hidayatullah State Islamic University Jakarta

^{1,2,3,4}Jl. Ir H. Juanda No.95, Ciputat, Kec. Ciputat Tim, Kota Tangerang Selatan, Banten 15412

email: ¹muhammadnaufalzulfikar@gmail.com, ²kaila.salsabilla21@mhs.uinjkt.ac.id,

³daffa.fadhilah21@mhs.uinjkt.ac.id, ⁴fitroh@uinjkt.ac.id

ABSTRACT

This research aims to develop a comprehensive understanding of the platforms and methods used in developing Geographic Information Systems (GIS) in Indonesia. Methods of Systematic Literature Analysis are involved to identify commonly used platforms, design method, and development method for GIS development. The data used came from journals published between 2018 and 2023, 82 pieces of literature were found from Publish or Perish and Google Scholar. The research results show that Waterfall method is the most widely used for development method as many as 25 journals use this method, for design method UML (Unified Modeling Language) is the most often used in total 52 journals using this method, and the platforms that are most frequently used or popular in the last 5 years in GIS development in Indonesia is Web-based as many as 54 out of 82 journals that we reviewed. This article provides valuable insights for practitioners, researchers, and decision makers who are interested in developing and utilizing GIS in Indonesia

Keywords – Geographic Information Systems, Platforms, Methods, Systematic Literature Review

1. Introduction

Geographic Information System (GIS) is a computer-based system designed to allow algorithms to operate with the aim of recognizing specific locations on the earth's surface. In addition, Geographic Information Systems (GIS) provide information about spatial and non-spatial aspects of natural events on the earth's surface, including vector data that convey position information. [1]

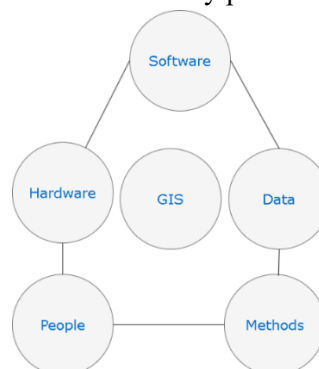


Figure 1. Component of a GIS

Indonesia, as the country with the largest territory in the world, faces unique challenges in developing GIS. One of them is the scarcity of resources and technological limitations. GIS projects require sophisticated hardware and software infrastructure, which is not always easy to access or manage throughout Indonesia.

Stated by [2] and [3] Geographic Information Systems (GIS) have become key in mapping, urban planning and decision making in various sectors. In Indonesia, the use of GIS is growing, but knowledge about the platforms and methods most commonly used in GIS development is still limited. Especially the issues related to data and policy are also important problems. In GIS development, access to quality and up-to-date geographic data is the most important key.



Figure 2. GIS Platform
(Source : www.esri.com)

As can be seen in figure 2, [4] there are several platforms that can be used in to access GIS data. However, there are difficulties in maintaining, accuracy, and access to this data. Policies that support the use and development of GIS also play a crucial role. A deep understanding of these challenges is important to develop effective solutions and increase the use of GIS in Indonesia.

2. Method

In this article, the research aims to develop a deeper understanding of the platforms and methods used in GIS development in Indonesia, the Systematic Literature Review (SLR) method is used which entails a systematic procedure for recognizing, assessing, and comprehending the entirety of accessible research findings, with the objective of delivering precise responses to research inquiries. [5] The Research Question (RQ) phase encompasses queries linked to the chosen research subject by the author. In this article, following are the inquiries:

RQ1: What development methods are commonly used in developing GIS applications in Indonesia?

RQ2: What design methods are commonly used in developing GIS applications in Indonesia?

RQ3: What platforms are commonly used in developing GIS applications in Indonesia?

Academic articles were discovered via the Google Scholar Web Based page (<https://scholar.google.com/>) and the Publish or Perish software by employing pertinent keywords associated with the research subject within search engines such as “Rancang Bangun Sistem Informasi Geografis”. The articles are written in Indonesian and can be accessed on the internet. This question was conducted with the aim of answering the Research Question (RQ). The author selects literature based on predetermined criteria. These criteria include:

- 1) The data used comes from journals published between 2018 and 2023.
- 2) Data is collected through the use of Google Scholar and the Publish or Perish application.
- 3) The data used relates to Geographic Information System (GIS) Development in Indonesia.

3. Result and Analysis

The review revealed a notable preference for open-source GIS development platforms within the Indonesian context. Platforms such as Web Based and Mobile Application were identified as widely used, fostering cost-effective and collaborative GIS solutions. The complexity of GIS applications necessitates a systematic approach to design, development, and implementation. However, there are several limitations in creating this article, one of which is that the journals we reviewed are in Indonesian that only stick on commonly keyword such as “Rancang Bangun Sistem Informasi Geografis”, and only collected via Google Scholar, the journals we reviewed are not very numerous and broad in a scope perspective. But this can be knowledge goals, as well as a future need to develop and implement GIS in all countries.

Table 1. Literature Review

<i>Author</i>	<i>Title</i>	<i>Development Methods</i>	<i>Design Methods</i>	<i>Platforms</i>
Fitri Nuraeni, Erwin Gunadhi Rahayu, Moch. Lutfhi Waliyul Fahmi. (2023).	Rancang Bangun Sistem Informasi Geografis Pendataan Jalan di Kabupaten Garut Berbasis Web Based. [6]	RUP	UML	WEB BASED
Prasetyo, A., Poerwanto, B., Hardiana, H., & Ruhamah, R. (2019).	Rancang Bangun Sistem Informasi Geografis Pemetaan lokasi dan spesifikasi Hotel di Kota Palopo Berbasis Web Basedsite. [7]	Waterfall	UML	WEB BASED
Sahrin, N., & Sularno, S. (2023).	Rancang Bangun Sistem Informasi Geografis Menemukan Lokasi Dokter Hewan Berbasis Android. Jurnal Teknologi Dan Sistem Informasi Bisnis. [8]	RAD	UML	WEB BASED
Paranduk, J. (2022).	Rancang Bangun Sistem Informasi Geografis Pemetaan Rumah Ibadah berbasis Web Based gis. [9]	-	UML	WEB BASED
Fauzan, M. and Diartono, D. A. (2023).	Design of forest and land fire complaint system in BPBD Tebo Jambi regency [10]	SDLC	UML	WEB BASED
Satria, Ricky, Royana Afwani, and Sri Endang Anjarwani. (2021).	Rancang Bangun Sistem Informasi Geografis untuk Pemetaan Lokasi Tempat Ibadah di Kota Mataram Menggunakan Metode Extreme Programming. [11]	Extreme Programming, And SDLC	UML	WEB BASED and Mobile Application
Akhmad Fauzi. (2020).	Rancang Bangun Sistem Informasi Geografis Destinasi Wisata Kabupaten Brebes Menggunakan Metode Prototyping. [12]	Prototype	DFD	WEB BASED
Wiko Ananta. (2019).	Rancang Bangun Sistem Informasi Geografis Scooterstmaps Berbasis Android Terhadap Beberapa Bengkel Vespa Di Kota Padang. [13]	-	UML	Mobile Application
Nugraha, Aditya. (2020).	Rancang Bangun Sistem Informasi Geografis Posyandu Berbasis Web Based Menggunakan Metode Extreme Programming. [14]	Extreme Programming	UML	WEB BASED
Doni Saputra. (2021).	Rancang Bangun Berbasis Android Pada Sistem Informasi Geografis Lokasi Studio Foto di Bandar Lampung. [15]	-	UML	Mobile Application And Desktop
Sulastio, B. S., Anggono, H., & Putra, A. D. (2021)	Sistem Informasi Geografis Untuk Menentukan Lokasi Rawan Macet di Jam Kerja Pada Kota Bandar Lampung pada Berbasis Android. [16]	-	UML	Mobile Application
Handry Setiawan. (2020).	Rancang Bangun Jalur Pengiriman Surat Kabar Prestasi Reformasi Menggunakan Sistem Informasi Geografis. [17]	Waterfall	UML	WEB BASED
Kendrawan, D. C. Khrisne, and G.	Rancang Bangun Berbasis Android Pada Sistem Informasi Geografis Lokasi Studio Foto di Bandar Lampung. [18]	SDLC	UML	Mobile Application

Sukadarmik. (2018).				
Annas Setiawan Prabowo, Lutfi Syafirullah, Vicky Prasetya, Hera Susanti. (2021).	Rancang Bangun Sistem Informasi Geografis Kabupaten Cilacap (SIKECAP). [19]	RAD	UML	WEB BASED
Kurniawati, A.T., Agustien, D., & Andriani, S.A. (2018).	Rancang Bangun Sistem Informasi Geografis Pemetaan Penyebaran Penduduk Wilayah Kota Bekasi. [20]	-	-	WEB BASED
Noviyanti, C., Erawati, W., & Lesmana, H. (2020).	Rancang Bangun Pemetaan UMKM Kota Tegal Berbasis Sistem Informasi Geografis. [21]	Waterfall	ERD	WEB BASED
Kurniawan, Aden (2018)	Perancangan Aplikasi Sistem Informasi Geografis Pencarian Lokasi dan Apotek 24 Jam di Kota Jambi Berbasis Android. [22]	-	UML	Mobile Application
Putra, P.P. (2018).	Rancang Bangun Sistem Informasi Geografis Capaian Pendidikan Formal Sebagai Alat Pendukung Kebijakan Dinas Pendidikan dan Kebudayaan Provinsi NTB. [23]	Waterfall	-	WEB BASED
Hartanti, D., Lubis, H., & Handayani, D. (2018).	Rancang Bangun Sistem Informasi Geografis Pendataan Infrastruktur Jalan Berbasis Android. [24]	-	UML	Mobile Application
Alamsyah, N., Erpurini, W., & Setiawan, F. (2021).	Rancang Bangun Sistem Informasi Geografis Berbasis Web Based site Untuk Pemetaan Objek Wisata Pada Dinas Kebudayaan Dan Pariwisata Pada Kota Bandung. [25]	-	UML	WEB BASED
Huda, A.N., Balafif, N., & Murtadho, M.A. (2021).	Perancangan Sistem Informasi Geografis Pariwisata di Jombang Berbasis Mobile. [26]	Waterfall	UML	Mobile Application
Nurhindarto, A., Santoso, D.R., & Hidayat, E.Y. (2020).	Rancang Bangun Aplikasi Sistem Informasi Geografis Objek Wisata dan Kuliner di Kabupaten Kudus Berbasis Smartphone Android. [27]	-	UML	Mobile Application
Lubis, H., Rahmadani, S., & Lubis, I. (2023).	Aplikasi Objek Wisata Halal Kabupaten Dairi Berbasis Android. [28]	Waterfall	-	Mobile Application
Anam S, C. (2023).	Anam S, C. (2023). Rancang Bangun Sistem Informasi Geografis Pariwisata Kabupaten Bima berbasis Web Based. Jurnal Impresi Indonesia. [29]	Waterfall	-	WEB BASED
Sukatmi, Sukatmi, and Rexa A. Rizi. (2021)	Rancang Bangun Sistem Informasi Geografis Pariwisata di Lampung Timur. [30]	Extreme Programming	UML	WEB BASED
a Putra, I. M. A. W., Yoga, I. M. K., & Kusuma, I. G. N. A. (2019).	Rancang Bangun Sistem Informasi Geografis Pemetaan Tempat Kost di Kecamatan Kuta Selatan Menggunakan Framework Laravel. (31)	Waterfall	-	WEB BASED
Purwadi, Hadi, et al. (2018).	Implementasi Sistem Informasi Geografis pada Aplikasi Data Orang Hilang. (Studi Kasus: Polres Tasikmalaya Kota). [32]	Waterfall	-	Desktop
Hamjang&Gafrun, (2021).	Sistem Informasi Geografis Berbasis Web Based Pemetaan Lokasi Toko Oleh-Oleh Khas Samarinda. [33]	-	DFD	WEB BASED
Yudhi Kasih Pasaribu, Oky Dwi Nurhayati, Ike Pertiwi Windasari. (2022).	Sistem Informasi Geografis Lokasi Kantor Pemerintahan di Kota Semarang Berbasis Web Based. [34]	Waterfall	UML	WEB BASED
Suhartini, dkk. (2022).	Aplikasi Sistem Informasi Geografis (Sig) Pemetaan Lahan Pertanian Dan Komoditas Hasil Panen Di Kabupaten Sidrap Berbasis Web Based. [35]	Prototype	-	-
Wayan Widi Karsana dan Gede Surya Mahendra. (2021)	Sistem Informasi Geografis Pemetaan Lokasi Puskesmas Menggunakan Google Maps Api Di Kabupaten Badung. [36]	Waterfall	DFD	-
Nur, Amri, Dkk (2023)	Rancang Bangun Sistem Informasi Geografis Pemetaan Wilayah Penderita Penyakit Stunting [37]	Waterfall	-	Desktop

Fadli, (2023).	Rancang Bangun Sistem Informasi Geografis Untuk Pemetaan Lokasi Bengkel Sepeda Motor Di Kota Mataram Menggunakan Metode Waterfall. [38]	Waterfall	-	WEB BASED
Tines, Risto. (2021).	Rancang Bangun Sistem Informasi Geografis Penyebaran Lokasi Penyalahgunaan Narkoba Dikabupaten Kuantan Singingi [39]	-	UML	WEB BASED
Putri, Ega E., and Randika F. Bania. (2021).	Rancang Bangun Sistem Informasi Geografis (Sig) Praktek Kerja Lapangan (Pkl) Berbasis Web Based (Studi Kasus Universitas Dharmawangsa). [40]	SDLC	UML	WEB BASED
Syafitri, Yuli, and Muhammad Rizal. (2020)	Rancang Bangun Sistem Informasi Pemetaan Toko Oleh-oleh dan Souvenir Khas Lampung Dikota Bandar Lampung Berbasis Android. [41]	Extreme Programming	UML	Mobile Application
Linda, Detra. (2020).	Rancang Bangun Sistem Informasi Geografis Untuk Menentukan Letak-letak Sekolah Tertinggal (Sekolah Tidak Terjangkau Internet) Pada Tingkat Smp/mts. [42]	-	UML	WEB BASED
Beze, Husmul. (2020).	Rancang Bangun Tanggap Darurat Bencana Berbasis Sistem Informasi Geografis (SIG). [43]	SDLC	-	WEB BASED
Sundari, Shinta S., et al. (2022).	Rancang Bangun Aplikasi Sistem Pakar Diagnosa Penyakit Mata Berbasis Web Based dengan Metode Forward Chaining dan Case Based Reasoning (Studi Kasus : Poli Mata RSIA Widaningsih Tasikmalaya). [44]	Prototype	UML	WEB BASED
Tumanggor, Amiruddin, and Mizandi Feldi. (2021).	Tinjauan Lokasi Pariwisata di Pematangsiantar melalui Sistem Informasi Geografis Berbasis Web Based. [45]	-	-	WEB BASED
Istiqomah, Putri D, and Wahyu A. Kusuma. (2018).	Sistem Informasi Geografis Kurir Asi di Kota Malang Berbasis Web Basedsite (Studi Kasus : Simomi). [46]	Waterfall	UML	WEB BASED
Ariandi, Muhamad, and Eka P. Agustini. (2018).	Sistem Informasi Geografis Penyebaran Penduduk di Kecamatan Rambutan untuk Analisa di Bidang Kependudukan. [47]	R&D	UML	WEB BASED
Mardianti, Donna. (2021)	Implementasi Sistem Informasi Geografis Pelayanan Kesehatan di Kuantan Singingi Berbasis Web Based. [48]	-	UML	WEB BASED
Wibowo, Ari. (2021).	Sistem Informasi Geografis Pemetaan Lokasi Rawan Kecelakaan Lalu Lintas Kabupaten Kuantan Singingi. [49]	-	UML	WEB BASED
Octo, Julian. (2021).	Sistem Informasi Geografis Pemetaan E-wakaf sebagai Pengelolaan Aset Wakaf pada Kantor Kementerian Agama Kabupaten Kuantan Kuantan Singingi. [50]	Waterfall	UML	WEB BASED
Sukatmi, and Rika Maliya. (2020).	Sistem Informasi Geografis Puskesmas di Bandar Lampung. [51]	Extreme Programming	UML	WEB BASED
Mukminna, Halimahtus, and Diah A. W. Kusumastutie. (2022).	Geographic Information Systems for Road Damage Complaints Based on Mobile. [52]	Waterfall	UML	Mobile Application
Ganiardi, Muhammad A. G. A. (2020).	Analisis dan Perancangan Sistem Informasi Geografi Pengembangan Perumahan Penduduk Berbasis Komponen. [53]	-	UML	WEB BASED
Kambuno, Natalia B., et al. (2020).	Sistem Informasi Geografis Pemetaan Tempat Kos di Samarinda Berbasis Web Based. [54]	Waterfall	-	WEB BASED
Taboy, Adriana H, et al. (2020).	Sistem Informasi Geografis Objek Wisata Kabupaten Timor Tengah Selatan Berbasis Web Based. [55]	Waterfall	ERD	WEB BASED
Santoso, Agustinus B., et al. (2021).	Penerapan Google API Service pada Sistem Informasi Geografis untuk Pemasaran dan Pemetaan Kelompok UKM Kota Salatiga. [56]	Waterfall	UML	WEB BASED
Purwadi, Hadi, et al. (2018).	Implementasi Sistem Informasi Geografis pada Aplikasi Data Orang Hilang (Studi Kasus: Polres Tasikmalaya Kota). [57]	Waterfall	ERD	Desktop
Susanto. (2018).	Sistem Informasi Geografis Pemetaan Kantor Dinas di Kota Lubuklinggau Berbasis Android. [58]	Waterfall	UML	Mobile Application

Khusnawati, Nisaul A., and Abdi P. Kusuma. (2020).	Sistem Informasi Geografis Pemetaan Potensi Wilayah Peternakan Menggunakan Weighted Overlay. [59]	-	DFD	WEB BASED
Fathudin, Aslam, and Saifuddin Saifuddin. (2019).	Sistem Informasi Geografis Wisata Gunung di Pekalongan Berbasis Android. [60]	Waterfall	DFD and ERD	Mobile Application
Radliya, Nizar R, et al (2018).	Pengembangan Sistem Informasi Geografis Menggunakan Konsep Participatory Gis dalam Manajemen Tata Ruang Wilayah Kabupaten Bandung. [61]	R&D	RAD and UML	WEB BASED
Ferdiansyah, Muhammad. (2021).	Sistem Informasi Geografis Tempat Pariwisata Bersejarah di Wilayah Bandar Lampung Berbasis Web Based. [62]	Extreme Programming	UML	WEB BASED
Fahmi. (2018).	Implementasi Sistem Informasi Geografis Penentuan Rute Hotel Terdekat menggunakan Algoritma Dijkstra Di Kab. Majalengka. [63]	RUP	-	WEB BASED
Pitrawati, and Verawati Verawati. (2022).	Sistem Informasi Geografis pada Jasa Laundry di Bandar Lampung. [64]	Extreme Programming	UML	WEB BASED
Masrianto, et al. (2020).	Implementasi Peta Digital untuk Smart Village (Studi Kasus Desa Tammangalle, Polewali Mandar). [65]	-	-	WEB BASED
Pasaribu, A. F. O., et al. (2019).	Sistem Informasi Geografis untuk Pencarian Lokasi Bengkel Mobil di Wilayah Kota Bandar Lampung. [66]	-	UML	Mobile Application
Lasena, Marlin, and Ramli A. Rahman. (2021).	Sistem Informasi Geografis Lokasi Rumah Pejabat Polda Gorontalo Berbasis Android.[67]	R&D	UML	Mobile Application
Faqih, Husni, and Tika D. Avisha. (2019).	Geographic Information System Penyebaran Penyakit Puskesmas Kaligangsa Wetan. [68]	RAD	ERD	Desktop
Darmansyah, et al. (2021).	Perancangan Sistem Informasi Geografis Penyelenggara Pernikahan di Kabupaten Karawang. [69]	SDLC and Waterfall	UML	WEB BASED
Monica, Sri Y, and Mulkan Fadhli. (2022).	Pengembangan Aplikasi Pemetaan Desa/ Gampong Layak Anak Berbasis Sistem Informasi Geografis pada Kuta Alam Banda Aceh: Application Development Of Child-Friendly Village Mapping Geographic Information System Based Of Kuta Alam Banda Aceh. [70]	-	ERD	WEB BASED
Wahyudi, Rizki, and Tri Astuti. (2018).	Sistem Informasi Geografis (Sig) Pemetaan Bencana Alam Kabupaten Banyumas Berbasis Web Based. [71]	Extreme Programming	UML	WEB BASED
Warjiyono, et al. (2020).	Sistem Informasi Layanan Pengaduan Kerusakan Jalan Berbasis Geographic Information System. [72]	Extreme Programming	-	Desktop
Arribe, Edo. (2018).	Implementasi Aplikasi Smart Tourism pada Dinas Pariwisata Kabupaten Kampar. [73]	-	DFD and ERD	WEB BASED
Adiputra, I. P. G. W., Purnama, I. N., & Permana S, P. T. H. (2023).	RANCANG BANGUN SISTEM INFORMASI GEOGRAFIS PELANGGAN POTENSIAL BERBASIS WEB (STUDI KASUS PT. INDONESIA COMNETS PLUS). [74]	-	UML	WEB BASED
Rahman, Andini U, and Satriadi D. Ali. (2019).	Sistem Informasi Geografis Potensi Sumber Daya Alam di Wilayah Kabupaten Banggai Kepulauan Berbasis Android. [75]	Waterfall	RAD and UML	Mobile Application
Syafitri, Yuli. (2018).	Membangun Sistem Informasi Geografi untuk Pencarian Perusahaan Finance di Bandar Lampung. [76]	Extreme Programming	UML	WEB BASED
Hermawan, Rian. (2018).	Perancangan Sistem Pemetaan Tanah Tanaman Nanas (Studi Kasus: Kabupaten Subang). [77]	RUP	UML	WEB BASED
Husna, Fadilla T. (2021).	Sistem Informasi Geografis Pendataan Jalan Berbasis Web Based di Wilayah Kuantan Singingi (Studi Kasus Dinas Pupr Kuantan Singingi). [78]	-	UML	WEB BASED
Efendi, Dwi M., et al. (2018)	Sistem Informasi Geografis Lokasi Kos dan Penginapan Berbasis Web Based pada Wilayah Kotabumi Kabupaten Lampung Utara. [79]	Extreme Programming	UML	WEB BASED
Utomo, Nugroho S., and Yanto Budisusanto. (2020).	Perancangan Web BasedGIS sebagai Instrumen dalam Menganalisa Permasalahan Pertanian (Studi Kasus: Kantor Pertanahan Kota Malang). [80]	-	-	WEB BASED

Munandar, Arief, et al. (2020).	Pemetaan Kehamilan dan Pemantauan Berbasis Web Based Sistem Informasi Geografis. [81]	-	-	WEB BASED
Desmarita. (2021).	Implementasi Sistem Informasi Geografis Memonitoring Industri Kecil Menengah Berbasis Android. [82]	-	-	-
P., Brian S. A., and Dwi A. Diartono. (2021).	Implementasi Aplikasi Mobile Trevel Guide di Sektor Kota Semarang. [83]	-	UML	Mobile Application
Karim, Syafei, et al. (2022).	Sistem Informasi Geografis Pemetaan Daerah Rawan Banjir di Kota Samarinda Berbasis Web Based. [84]	Waterfall	DFD	WEB BASED
Robert. (2021).	Implementasi Sistem Informasi Geografis Pencarian Bengkel Terdekat untuk Kabupaten Kuantan Singingi Berbasis Android. [85]	-	UML	Mobile Application
Saputra, Alfindes. (2021).	Sistem Informasi Geografis Pemesanan Lapak Di Event Pacu Jalur Tradisional Di Tepian Narosa Teluk Kuantan Berbasis Web Based. [86]	-	UML	WEB BASED
Sahrin, Nori, et al. (2022).	Perancangan Sistem Informasi Geografis Wisata Halal Provinsi Sumatera Barat Berbasis Mobile. [87]	Waterfall	UML	Mobile Application

Previous research from 2018 to 2023 mounting to 82 studies in terms of similarities themes. Indonesia is an archipelagic country with diverse geography, including mountains, islands, forests, and coastal areas. GIS applications are crucial for managing and analyzing spatial data related to natural resources, land use, and environmental conservation contributing to the promotion of tourism by mapping tourist destinations. [87] [73] [25] [30] The country is prone to natural disasters such as earthquakes, volcanic eruptions and floods. GIS applications are critical to disaster preparedness, response, and recovery. They enable real-time monitoring, risk assessment, and evacuation planning. [43] [71]

3.1 What development methods are commonly used in developing GIS applications in Indonesia?

Table 2 displays the grouping results answer RQ1.

Table 2. Geographic Information System Development Methods

<i>No</i>	<i>Development Methods</i>	<i>Total</i>
1	Not Mentioned	29
2	Waterfall	25
3	Extreme Programming	11
4	SDLC	7
5	RUP	3
6	Prototype	3
7	R&D	3

Based on information in table 2 methods development frequently used systems in building geographic information systems in Indonesia is Waterfall Methods. However, there were 29 studies that did not mention development methods system used. The advantage of using the waterfall method in system development is that the quality of the resulting system will be good because the implementation is carried out in stages. [60] [75] While Extreme Programming requires a team that is formed on a small scale to the medium and this method is also suitable if teams are faced with requirements that are not clear or changes occur very fast need. [30] [14]

The waterfall method can be a more systematic and sequential model for information system development. [36] While the disadvantage is that the system development Information processing requires a lot of time and is also expensive. [75]

3.2 What design methods are commonly used in developing GIS applications in Indonesia?

Table 3 displays the grouping results answer RQ2.

Table 3. Geographic Information System Design Method

<i>No</i>	<i>Design Methods</i>	<i>Total</i>
1	UML	52
2	Not Mentioned	18
3	ERD	7
4	DFD	7
5	RAD	5

Based on information in table 3 design methods frequently used systems in building geographic information systems in Indonesia is UML (Unified Modelling Language), However. there were 18 studies that did not mention development methods system used.

One of the reasons why many people use UML is because the functionality. As stated by [18] Use Case Diagrams can describe the functionality that must exist in the system to be built. In UML there must be use case diagrams to explain the relationship of all cases (case) that will be processed by the software and its actors in the Geographic Information System. [75] The stages are Analysis in the form of Use cases such a of Activity diagrams, Class diagrams, Design tables, and UI Design. [11] [25] [75]

3.3 What platforms are commonly used in developing GIS applications in Indonesia?

Table 4 displays the grouping results answer RQ3.

Table 4. Geographic Information System Platforms

<i>No</i>	<i>Platforms</i>	<i>Total</i>
1	WEB BASED	54
2	Mobile Application	20
3	Desktop	6
4	Not Mentioned	3

Based on information in table 4 platforms are most often used in the development of geographic information systems in Indonesia is WEB BASED (World Wide Web Based). and the second most used is Mobile Application.

According to [11], [15], [24] the GIS application system can be accessed anywhere and at any time by people on any device mobile or Android-based mobile devices, making it easier for people to use the application. However, this application cannot be run offline, it requires internet to run the GIS application using a smartphone or mobile device. [27] Using a smartphone makes it easier for users to help navigate the places they want. Using GIS via smartphone is easier to use than via desktop or computer. [24]

Geographic Information Systems Web Based applications are no longer limited to the use of a single computer, but can now be accessed via many other electronic devices such as tablets, smartphones and televisions. [53] Web-based GIS is popular because of its global accessibility, ease of end-user, access integration with online resources, and efficient scalability and maintenance. This enables easy data distribution, collaboration without geographic boundaries, and real-time information updates. However, the choice between web-based, desktop, or mobile GIS depends on the user's needs and preferences.

Although web-based GIS has many advantages, there are also situations where desktop or mobile applications are more appropriate, depending on the specific needs of the project and user preferences.

4. Conclusion

Based on the results of research that has been carried out by conducting a literature review of 82 studies with the same theme, This article were created to find out system development methods, design methods and platforms used in building GIS. In 2018-2023 there are results of development method, design method, and platforms that are often used. The waterfall is a development method that is often used as many as 25 journal uses, UML (Unified Modeling Language) for design method, and the Platforms that are most frequently used or popular in the last 5 years in GIS development in Indonesia is Web-based as many as 54 out of 82 journals that we reviewed.

Author hoped that the results of this systematic literature analysis can provide valuable insights for practitioners, researchers, and decision makers interested in developing and utilizing GIS in various countries.

References

- [1] Kurniawati, U. F, Handayeni, K. E, Nurlaela, S, Idajati, H, Firmansyah, F, Pratomoadojo, N. A, & Septriadi, R. S. (2020). Pengolahan Data Berbasis Sistem Informasi Geografis (SIG) di Kecamatan Sukolilo. SEWAGATI. <https://doi.org/10.12962/j26139960.v4i3.8048>.
- [2] Jankowski, P.; Nyerges, T. Geographic Information Systems for Group Decision Making: Towards a Participatory, Geographic Information Science; Taylor & Francis: Oxfordshire, UK, 2001; ISBN 0-7484-0932-7.
- [3] Prayitno. (2000). Sistem Informasi Geografis. Yogyakarta: Andi Offset.
- [4] Esri Technology. (2014). ArcGIS for Desktop Now Includes ArcGIS Online Subscription, accessed 28 October 2023, <https://www.esri.com/about/newsroom/arcnews/arcgis-for-desktop-now-includes-arcgis-online-subscription/>.
- [5] Barbara Kitchenham, O. Pearl Brereton, David Budgen, Mark Turner, John Bailey, Stephen Linkman. (2009). Systematic literature reviews in software engineering – A systematic literature review, Information and Software Technology, Volume 51, Issue 1, Pages 7-15, ISSN 0950-5849, <https://doi.org/10.1016/j.infsof.2008.09.009>. M. Young, The Technical Writer's Handbook. Mill Valley, CA: University Science, 1989.
- [6] F. Nuraeni, R. E. G. Rahayu, dan M. L. W. Fahmi. (2023). "Rancang Bangun Sistem Informasi Geografis Pendataan Jalan di Kabupaten Garut Berbasis Web Based", Jurnal Algoritma, vol. 20, no. 1, hlm. 32-41.
- [7] Prasetyo, A., Poerwanto, B., Hardiana, H., & Ruhamah, R. (2019). Rancang Bangun Sistem Informasi Geografis Pemetaan lokasi dan spesifikasi Hotel di Kota Palopo Berbasis Web Basedsite. Patria Artha Technological Journal.
- [8] Sahrnun, N., & Sularno, S. (2023). Rancang Bangun Sistem Informasi Geografis Menemukan Lokasi Dokter Hewan Berbasis Android. Jurnal Teknologi Dan Sistem Informasi Bisnis, 5(1), 21-32. <https://doi.org/10.47233/jteksis.v5i1.732>.
- [9] Paranduk, J. (2022). Rancang Bangun Sistem Informasi Geografis Pemetaan Rumah Ibadah berbasis Web Basedgis. D'compute: Jurnal Ilmiah Teknologi Informasi Dan Ilmu Komputer, 12(1). <https://doi.org/10.30605/dcompute.v12i1.42>.
- [10] Fauzan, M. and Diartono, D. A. (2023) "Design of forest and land fire complaint system in BPBD Tebo Jambi regency", Jurnal Mantik, 7(1), pp. 271-283. Available at: <https://iocscience.org/ejournal/index.php/mantik/article/view/3718> (Accessed: 29October 2023).
- [11] Satria, Ricky, Royana Afwani, and Sri Endang Anjarwani. (2021). "Rancang Bangun Sistem Informasi Geografis Untuk Pemetaan Lokasi Tempat Ibadah Di Kota Mataram Menggunakan Metode Extreme

- Programming.” *Journal of Computer Science and Informatics Engineering (J-Cosine)* 5.2. 111–119. Web Based.
- [12] Akhmad Fauzi. (2020). Rancang Bangun Sistem Informasi Geografis Destinasi Wisata Kabupaten Brebes Menggunakan Metode Prototyping. Skripsi thesis, UIN SUNAN KALIJAGA YOGYAKARTA.
- [13] Putra, Wiko Ananta. (2019). Rancang Bangun Sistem Informasi Geografis Scooteristmaps Berbasis Android Terhadap Beberapa Bengkel Vespa Di Kota Padang. Sarjana thesis, Universitas Putra Indonesia "YPTK" Padang.
- [14] Nugraha, Aditya. (2020). Rancang Bangun Sistem Informasi Geografis Posyandu Berbasis Web Based Menggunakan Metode Extreme Programming. Skripsi thesis, UIN SUNAN KALIJAGA YOGYAKARTA.
- [15] Doni Saputra. (2021). Rancang Bangun Berbasis Android Pada Sistem Informasi Geografis Lokasi Studio Foto di Bandar Lampung. *Jurnal Teknologi Pintar* Vol. 1 No.1.
- [16] Sulastio, B. S, Anggono, H, & Putra, A. D. (2021). Sistem Informasi Geografis Untuk Menentukan Lokasi Rawan Macet di Jam Kerja Pada Kota Bandar Lampung pada Berbasis Android. *Jurnal Teknologi Dan Sistem Informasi*, 2(1), 104–111.
- [17] Handry Setiawan. (2020). Rancang Bangun Jalur Pengiriman Surat Kabar Prestasi Reformasi Menggunakan Sistem Informasi Geografis. Skripsi thesis, Universitas Pembangunan Panca Budi.
- [18] Kendrawan, D. C. Khrisne, and G. Sukadarmika. (2018). “Rancang Bangun Berbasis Android Pada Sistem Informasi Geografis Lokasi Studio Foto di Bandar Lampung”, *SINTECH Journal*, vol. 1, no. 2, pp. 76 – 82.
- [19] Prabowo, A.S, Syafirullah, L, Prasetya, V, & Susanti, H. (2021). Rancang Bangun Sistem Informasi Geografis Industri Kreatif Kabupaten Cilacap (SIKECAP). *JOINS (Journal of Information System)*.
- [20] Kurniawati, A.T, Agusten, D., & Andrini, S.A. (2018). Rancang Bangun Sistem Informasi Geografis Pemetaan Penyebaran Penduduk Wilayah Kota Bekasi.
- [21] Noviyanti, C, Erawati, W, & Lesmana, H. (2020). Rancang Bangun Pemetaan UMKM Kota Tegal Berbasis Sistem Informasi Geografis. *Indonesian Journal on Software Engineering (IJSE)*.
- [22] Kurniawan, Aden. (2018). Perancangan Aplikasi Sistem Informasi Geografis Pencarian Lokasi dan Apotek 24 Jam di Kota Jambi Berbasis Android. Skripsi thesis, STIKOM Dinamika Bangsa Jambi.
- [23] Putra, P.P. (2018). Rancang Bangun Sistem Informasi Geografis Capaian Pendidikan Formal Sebagai Alat Pendukung Kebijakan Dinas Pendidikan dan Kebudayaan Provinsi NTB.
- [24] Hartanti, Dian, et al. (2018). "Rancang Bangun Sistem Informasi Geografis Pendataan Infrastruktur Jalan Berbasis Android." *Petir*, vol. 11, no. 2, 2018, pp. 148-163, doi:10.33322/petir.v11i2.346.
- [25] Alamsyah, N, Erpurini, W, & Setiawan, F. (2021). Rancang Bangun Sistem Informasi Geografis Berbasis Web Basedsite Untuk Pemetaan Objek Wisata Pada Dinas Kebudayaan Dan Pariwisata PadaKota Bandung. *Jurnal Sains Sosio Humaniora*.
- [26] Huda, Ahmad N. S, et al. (2020). Perancangan Sistem Informasi Geografis Pariwisata di Jombang Berbasis Mobile. *G-Tech*, vol. 4, no, pp. 294-302, doi:10.33379/gtech.v4i1.564.
- [27] Nurhindarto, A., Santoso, D.R., & Hidayat, E.Y. (2020). Rancang Bangun Aplikasi Sistem Informasi Geografis Objek Wisata dan Kuliner di Kabupaten Kudus Berbasis Smartphone Android.
- [28] Lubis, H., Rahmadani, S, & Lubis, I. (2023). Aplikasi Objek Wisata Halal Kabupaten Dairi Berbasis Android.
- [29] Anam S, C. (2023). Rancang Bangun Sistem Informasi Geografis Pariwisata Kabupaten Bima berbasis Web Based. *Jurnal Impresi Indonesia*.
- [30] Sukatmi, and Rexa A. Rizi. (2021). "Rancang Bangun Sistem Informasi Geografis Pariwisata di Lampung Timur." *Jurnal Informasi dan Komputer*, vol. 9, no. 2, pp. 103-108, doi:10.35959/jik.v9i2.232.
- [31] Putra, I. M. A. W., Yoga, I. M. K., & Kusuma, I. G. N. A. (2019). Rancang Bangun Sistem Informasi Geografis Pemetaan Tempat Kost di Kecamatan Kuta Selatan Menggunakan Framework Laravel. *Jurnal Teknologi Informasi Dan Komputer*, 5(3). <https://doi.org/10.36002/jutik.v5i3.803>.
- [32] Purwadi, Hadi, et al. (2018). "Implementasi Sistem Informasi Geografis pada Aplikasi Data Orang Hilang (Studi Kasus: Polres Tasikmalaya Kota)." *Juita*, vol. 6, no. 1, pp. 1-8, doi:10.30595/juita.v6i1.1889.

- [33] Hamjang, F., & Gafrun, G. (2021). Sistem Informasi Geografis Berbasis Web Based Lokasi Toko Oleh Oleh Khas Sulawesi Tenggara. *Simtek : Jurnal Sistem Informasi Dan Teknik Komputer*, 6(1). <https://doi.org/10.51876/simtek.v6i1.88>.
- [34] Pasaribu, Y. K., Nurhayati, O. D., & Windasari, I. P. (2022). Sistem Informasi Geografis Lokasi Kantor Pemerintahan di Kota Semarang Berbasis Web Based. *Jurnal Ilmu Teknik Dan Komputer*, 6(1). <https://doi.org/10.22441/jitkom.v6i1.007>.
- [35] Masnur, Alam, S., & Ihsar, M. (2022). Aplikasi Sistem Informasi Geografis (Sig) Pemetaan Lahan Pertanian Dan Komoditas Hasil Panen Di Kabupaten Sidrap Berbasis Web Based. *SINTAKS LOGIKA*.
- [36] Karsana, I. W. W., & Mahendra, G. S. (2021). Sistem Informasi Geografis Pemetaan Lokasi Puskesmas Menggunakan Google Maps Api Di Kabupaten Badung. *Jurnal Komputer Dan Informatika*, 9(2). <https://doi.org/10.35508/jicon.v9i2.5214>.
- [37] Nur Amri, Fathurrahman, Saipul, Oktavia Nila. (2023). Rancang Bangun Sistem Informasi Geografis Pemetaan Wilayah Penderita Penyakit Stunting. *Jurnal Informatika dan Teknologi*. Vol 6. No 2.
- [38] Achmad Muchtarom, Fadil. (2023). Rancang Bangun Sistem Informasi Geografis Untuk Pemetaan Lokasi Bengkel Sepeda Motor Di Kota Mataram Menggunakan Metode Waterfall. S1 thesis, Universitas Mataram.
- [39] Tines, Risto. (2021). "Rancang Bangun Sistem Informasi Geografis Penyebaran Lokasi Penyalahgunaan Narkoba Di kabupaten Kuantan Singingi." *Jurnal Perencanaan, Sains, Teknologi, dan Komputer*, vol. 4, no.2, pp. 1067-1076, doi:10.36378/jupersatek.v4i2.2255.
- [40] Putri, Ega E, and Randika F. Bania. (2021). "Rancang Bangun Sistem Informasi Geografis (Sig) Praktek Kerja Lapangan (Pkl) Berbasis Web Based (Studi Kasus Universitas Dharmawangsa)." *Informatika*, vol. 13, no. 2, Dec., doi:10.36723/juri.v13i2.285.
- [41] Syafitri, Yuli, and Muhammad Rizal. (2020). "Rancang Bangun Sistem Informasi Pemetaan Toko Oleh-oleh dan Souvenir Khas Lampung Di kota Bandar Lampung Berbasis Android." *Jurnal Informasi dan Komputer*, vol. 8, no. 2, 27 Oct., pp. 12-23, doi:10.35959/jik.v8i2.180.
- [42] Linda, Detra. (2020). "Rancang Bangun Sistem Informasi Geografis Untuk Menentukan Letak-letak Sekolah Tertinggal (Sekolah Tidak Terjangkau Internet) Pada Tingkat Smp/mts." *Jurnal Perencanaan, Sains, Teknologi, dan Komputer*, vol. 3, no. 2, pp. 402-409.
- [43] Beze, Husmul. (2020). "Rancang Bangun Tanggap Darurat Bencana Berbasis Sistem Informasi Geografis (SIG)." *Buletin Loupe*, vol. 16, no. 02, 9 Dec. 2020, pp. 58-66, doi:https://jtsiskom.undip.ac.id/index.php/jtsiskom/announcement/view/49.
- [44] Sundari, Shinta S., et al. (2022). "Rancang Bangun Aplikasi Sistem Pakar Diagnosa Penyakit Mata Berbasis Web Based dengan Metode Forward Chaining dan Case Based Reasoning (Studi Kasus : Poli Mata RSIA Widaningsih Tasikmalaya)." *Jurnal Sistem Informasi dan Teknologi Informasi*, vol. 11, no. 1, pp. 91-100, doi:10.36774/jusiti.v11i1.914.
- [45] Tumanggor, Amiruddin, and Mizandi Feldi. (2021). "Tinjauan Lokasi Pariwisata di Pematangsiantar melalui Sistem Informasi Geografis Berbasis Web Based." *Sintaksis*, vol. 1, no. 2, pp. 54-58.
- [46] Istiqomah, Putri D., and Wahyu A. Kusuma. (2018). "Sistem Informasi Geografis Kurir Asi di Kota Malang Berbasis Web Basedsite (Studi Kasus : Simomi)." *Teknika: Engineering and Sains Journal*, vol. 2, no. 1, 29 Jun, pp. 25-32, doi:10.51804/tesj.v2i1.224.25-32.
- [47] Ariandi, Muhamad, and Eka P. Agustini. (2018). "Sistem Informasi Geografis Penyebaran Penduduk di Kecamatan Rambutan untuk Analisa di Bidang Kependudukan." *Jurnal Ilmiah Matrik*, vol. 20, no. 1, pp. 61-74.
- [48] Mardianti, Donna. (2021). "Implementasi Sistem Informasi Geografis Pelayanan Kesehatan di Kuantan Singingi Berbasis Web Based." *Jurnal Perencanaan, Sains, Teknologi, dan Komputer*, vol. 4, no. 2, pp. 1113-1123, doi:10.36378/jupersatek.v4i2.2260.
- [49] Wibowo, Ari. (2021). "Sistem Informasi Geografis Pemetaan Lokasi Rawan Kecelakaan Lalu Lintas Kabupaten Kuantan Singingi." *Jurnal Perencanaan, Sains, Teknologi, dan Komputer*, vol. 4, no. 1, pp. 9-18.
- [50] Octo, Julian. (2021). "Sistem Informasi Geografis Pemetaan E-wakaf sebagai Pengelolaan Aset Wakaf pada Kantor Kementerian Agama Kabupaten Kuantan Kuantan Singingi." *Jurnal Perencanaan, Sains, Teknologi, dan Komputer*, vol. 4, no. 1, pp. 843-848.

- [51] Sukatmi, and Rika Maliya. (2020). "Sistem Informasi Geografis Puskesmas di Bandar Lampung." *Jurnal Cendikia*, vol. 19, no. 1, pp. 419-423.
- [52] Mukminna, Halimahtus, and Diah A. W. Kusumastutie. (2022). "Geographic Information Systems for Road Damage Complaints Based on Mobile." *Jurnal Sistem Telekomunikasi, Elektronika, Sistem Kontrol, Power Sistem dan Komputer*, vol. 2, no. 1, Jan., pp. 55-64, doi:10.32503/jtecs.v2i1.2213.
- [53] Ganiardi, Muhammad A. G. A. (2020). "Analisis dan Perancangan Sistem Informasi Geografi Pengembangan Perumahan Penduduk Berbasis Komponen." *Jurnal Penelitian Ilmu dan Teknologi Komputer*, vol. 12, no. 2, 12 Oct, pp. 37-46.
- [54] Kambuno, Natalia B., et al. (2020). "Sistem Informasi Geografis Pemetaan Tempat Kos di Samarinda Berbasis Web Based." *Buletin Poltanesa*, vol. 21, no. 1, 1 Jun, pp. 11-17.
- [55] Taboy, Adriana H., et al. (2020). "Sistem Informasi Geografis Objek Wisata Kabupaten Timor Tengah Selatan Berbasis Web Based." *Jurnal Teknik Informatika Unika Santo Thomas*, vol. 5, no. 2, , pp. 118-126, doi:10.17605/jtiust.v5i2.937.
- [56] Santoso, Agustinus B., et al. (2021). "Penerapan Google API Service pada Sistem Informasi Geografis untuk Pemasaran dan Pemetaan Kelompok UKM Kota Salatiga." *Jurnal Inovtek Polbeng Seri Informatika*, vol. 6, no. 2, doi:10.35314/isi.v6i2.2097.
- [57] Purwadi, Hadi, et al. (2018). "Implementasi Sistem Informasi Geografis pada Aplikasi Data Orang Hilang (Studi Kasus: Polres Tasikmalaya Kota)." *Juita*, vol. 6, no. 1, 29 May, pp. 1-8, doi:10.30595/juita.v6i1.1889.
- [58] Susanto. (2018). "Sistem Informasi Geografis Pemetaan Kantor Dinas di Kota Lubuklinggau Berbasis Android." *Juita*, vol. 6, no. 1, 29 May, pp. 37-44, doi:10.30595/juita.v6i1.2491.
- [59] Khusnawati, Nisaul A., and Abdi P. Kusuma. (2020). "Sistem Informasi Geografis Pemetaan Potensi Wilayah Peternakan Menggunakan Weighted Overlay." *Jurnal Mnemonic*, vol. 3, no. 2, doi:10.36040/mnemonic.v3i2.2788.
- [60] Fatkhudin, Aslam, and Saifuddin. (2019). "Sistem Informasi Geografis Wisata Gunung di Pekalongan Berbasis Android." *Jurnal Ilmiah Ilmu Komputer*, vol. 5, no. 1, pp. 13-18, doi:10.35329/jiik.v5i1.26.
- [61] Radliya, Nizar R., et al. (2018). "Pengembangan Sistem Informasi Geografis Menggunakan Konsep Participatory Gis dalam Manajemen Tata Ruang Wilayah Kabupaten Bandung." *Jurnal Teknologi dan Informasi*.
- [62] Ferdiansyah, Muhammad. (2021). "Sistem Informasi Geografis Tempat Pariwisata Bersejarah di Wilayah Bandar Lampung Berbasis Web Based." *Jurnal Cendikia*, vol. 21, no. 1, , pp. 500-504.
- [63] Fahmi. (2018). "Implementasi Sistem Informasi Geografis Penentuan Rute Hotel Terdekat menggunakan Algoritma Dijkstra Di Kab. Majalengka." *Infotech Journal*, vol. 4, no. 1, 2018, doi:10.31949/inf.v4i1.821.
- [64] Pitrawati, and Verawati Verawati. (2022). "Sistem Informasi Geografis pada Jasa Loundry di Bandar Lampung." *Jurnal Cendikia*, vol. 22, no. 01, pp. 37-43.
- [65] Masrianto, et al. (2020). "Implementasi Peta Digital untuk Smart Village (Studi Kasus Desa Tammangalle, Polewali Mandar)." *Jurnal Ilmiah Ilmu Komputer*, vol. 6, no. 1, pp. 13-18, doi:10.35329/jiik.v6i1.125.
- [66] Pasaribu, A. F. O., et al. (2019). "Sistem Informasi Geografis untuk Pencarian Lokasi Bengkel Mobil di Wilayah Kota Bandar Lampung." *Jurnal Tekno Kompak*, vol. 13, no. 2, pp. 1-6, doi:10.33365/jtk.v13i2.323.
- [67] Lasena, Marlin, and Ramli A. Rahman. (2021). "Sistem Informasi Geografis Lokasi Rumah Pejabat Polda Gorontalo Berbasis Android." *Journal Scientific and Applied Informatics*, vol. 4, no. 3, pp. 286-297, doi:10.36085/jsai.v4i3.1838.
- [68] Faqih, H, & Avisha, TD. (2019). Geographic Information System Penyebaran Penyakit Puskesmas Kaligangsa Wetan. *Bina Insani ICT Journal*, 101.255.92.196, <http://101.255.92.196/index.php/BIICT/article/view/1098>.
- [69] Darmansyah, et al. (2021). "Perancangan Sistem Informasi Geografis Penyelenggara Pernikahan di Kabupaten Karawang." *Jurnal Interkom*, vol. 16, no. 3, pp. 53-62, doi:10.35969/interkom.v16i3.169.
- [70] Monica, Sri Y, and Mulkan Fadhli. (2022). "Pengembangan Aplikasi Pemetaan Desa/ Gampong Layak Anak Berbasis Sistem Informasi Geografis pada Kuta Alam Banda Aceh: Application Development Of Child-Friendly Village Mapping Geographic Information System Based Of Kuta Alam Banda Aceh." *Indonesian Journal of Machine Learning and Computer Science*, vol. 2, no. 1, pp. 10-17.

- [71] Wahyudi, Rizki, and Tri Astuti. (2018). "Sistem Informasi Geografis (Sig) Pemetaan Bencana Alam Kabupaten Banyumas Berbasis Web Based." *Jurnal Teknologi dan Informasi*, vol. 8, no. 2, doi:10.34010/jati.v8i2.1042.
- [72] Warjiyono, et al. (2020). "Sistem Informasi Layanan Pengaduan Kerusakan Jalan Berbasis Geographic Information System." *Jurnal Inovasi Informatika*, vol. 5, no. 1, pp. 1-10.
- [73] Arribe, Edo. (2018). "Implementasi Aplikasi Smart Tourism pada Dinas Pariwisata Kabupaten Kampar." *Jurnal Teknologi dan Open Source*, vol. 1, no. 2, doi:10.36378/jtos.v1i2.19.
- [74] Adiputra, I. P. G. W., Purnama, I. N., & Permana S, P. T. H. (2023). RANCANG BANGUN SISTEM INFORMASI GEOGRAFIS PELANGGAN POTENSIAL BERBASIS WEB (STUDI KASUS PT. INDONESIA COMNETS PLUS). *Jurnal Teknologi Informasi Dan Komputer*, 9(1). Retrieved from <https://jurnal.undhirabali.ac.id/index.php/jutik/article/view/2177>.
- [75] Rahman, Andini U, and Satriadi D. Ali. (2019). "Sistem Informasi Geografis Potensi Sumber Daya Alam di Wilayah Kabupaten Banggai Kepulauan Berbasis Android." *Jurnal Informatika UPGRIS*, vol. 5, no. 2, doi:10.26877/jiu.v5i2.4631.
- [76] Syafitri, Yuli. (2018). "Membangun Sistem Informasi Geografi untuk Pencarian Perusahaan Finance di Bandar Lampung." *Jurnal Cendikia*, vol. 15, no.1, pp. 49-57.
- [77] Hermawan, Rian. (2018). "Perancangan Sistem Pemetaan Tanah Tanaman Nanas (Studi Kasus: Kabupaten Subang)." *Jurnal Teknologi Informasi dan Komunikasi*, vol. 13, no. 2, pp. 162-176.
- [78] Husna, Fadilla T. (2021). "Sistem Informasi Geografis Pendataan Jalan Berbasis Web Based di Wilayah Kuantan Singingi (Studi Kasus Dinas PUPR Kuantan Singingi)." *Jurnal Perencanaan, Sains, Teknologi, dan Komputer*, vol. 4, no. 1, 2021, pp. 814-820.
- [79] Efendi, Dwi M., et al. (2018). "Sistem Informasi Geografis Lokasi Kos dan Penginapan Berbasis Web Based pada Wilayah Kotabumi Kabupaten Lampung Utara." *Jurnal Informasi dan Komputer*, vol. 6, no. 2, 2018, pp. 1-10.
- [80] Utomo, Nugroho S., and Yanto Budisusanto. (2020). "Perancangan Web BasedGIS sebagai Instrumen dalam Menganalisa Permasalahan Pertanahan (Studi Kasus: Kantor Pertanahan Kota Malang)." *Jurnal Teknik ITS*, vol. 9, no. 2, 2020, doi:10.12962/j23373539.v9i2.53694.
- [81] Munandar, Arief, et al. (2020). "Pemetaan Kehamilan dan Pemantauan Berbasis Web Based Sistem Informasi Geografis." *Jurnal Teknologi Informasi Respati*, vol. 15, no. 3, 2020, doi:10.35842/jtir.v15i3.374.
- [82] Desmarita. (2021). "Implementasi Sistem Informasi Geografis Memonitoring Industri Kecil Menengah Berbasis Android." *Jurnal Perencanaan, Sains, Teknologi, dan Komputer*, vol. 4, no. 2, 2021, pp. 1270-1284, doi:10.36378/jupersatek.v4i2.2279.
- [83] P., Brian S. A., and Dwi A. Diartono. (2021). "Implementasi Aplikasi Mobile Trevel Guide di Sektor Kota Semarang." *Jurnal Ilmiah Ilmu Komputer*, vol. 7, no. 1, 2 Apr. 2021, pp. 44-48, doi:10.35329/jiik.v7i1.185.
- [84] Karim, Syafei, et al. (2022). "Sistem Informasi Geografis Pemetaan Daerah Rawan Banjir di Kota Samarinda Berbasis Web Based." *Jurnal Informatika Merdeka Pasuruan*, vol. 7, no. 1, 23 Mar. 2022, doi:10.37438/jimp.v6i1.338.
- [85] Robert. (2021). "Implementasi Sistem Informasi Geografis Pencarian Bengkel Terdekat untuk Kabupaten Kuantan Singingi Berbasis Android." *Jurnal Perencanaan, Sains, Teknologi, dan Komputer*, vol. 4, no. 2, 2021, pp. 1094-1104, doi:10.36378/jupersatek.v4i2.2258.
- [86] Saputra, Alfindes. (2021). "Sistem Informasi Geografis Pemesanan Lapak Di Event Pacu Jalur Tradisional Di Tepian Narosa Teluk Kuantan Berbasis Web Based." *Jurnal Perencanaan, Sains, Teknologi, dan Komputer*, vol. 4, no. 2, 2021, pp. 1046-1053, doi:10.36378/jupersatek.v4i2.2253.
- [87] Sahrin, Nori, et al. (2022). "Perancangan Sistem Informasi Geografis Wisata Halal Provinsi Sumatera Barat Berbasis Mobile." *Jurnal Teknologi dan Sistem Informasi Bisnis*, vol. 4, no. 1, 2022, pp. 193-203, doi:10.47233/jteksis.v4i1.401.