

(Research/Review) Article

Utilization Application and System Geographical Information Website: Systematic Literature Review

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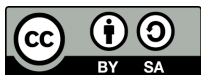
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Abstract: Geographic Information Systems (GIS) have become essential technological tools for collecting, storing, processing, analyzing, and visualizing spatial data to support various human activities. The rapid advancement of information technology has significantly expanded the use of GIS, particularly through web-based platforms and mobile applications, enabling wider accessibility and real-time data utilization. This study focuses on analyzing the utilization of GIS applications and websites across multiple sectors and their contributions to improving efficiency, accuracy, and decision-making processes in daily life. The main objective of this research is to identify, evaluate, and synthesize recent developments in GIS implementation through a systematic literature review. Scientific articles were collected from reputable international and national journals published within the last five years (2018–2022). A total of 130 international journals and 100 national journals were initially identified through database searches. After applying relevance screening and inclusion criteria, 33 selected articles were analyzed in depth to extract key findings, application trends, and potential research gaps. The results show that GIS applications and web-based systems play a vital role in supporting various sectors. In education, GIS facilitates spatial mapping for industrial internship placement (PRAKERIN) and school zoning management. In healthcare, GIS assists in mapping healthcare facilities, including pharmacies and hospitals, to improve service accessibility. In transportation, GIS-based systems provide route planning, traffic monitoring, and public transport information to enhance mobility and reduce congestion. GIS applications are also increasingly applied in environmental monitoring, disaster management, urban planning, and natural resource management. Overall, this study emphasizes the growing importance of GIS technologies as strategic tools for data-driven decision-making and sustainable development. The findings are expected to provide valuable insights for researchers, practitioners, and policymakers in optimizing GIS-based solutions to improve public services and quality of life.

Keywords: Geographic Information Systems; GIS Applications and Websites; Literature Studies; Spatial analysis; Decision support systems

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1. Introduction

The development of this information system has many branches, one of which is the geographic information system. This system focuses more on geography. The geographic system itself is an information management tool that is very closely related to the mapping and analysis system of everything from various events that occur on the surface of the earth. The use of this web-based geographic information system has become something popular in society (Ansal et al., 2021).

A Geographic Information System (GIS) is defined as an information system designed to work using data that has spatial information. This system checks, captures, integrates, manipulates, analyzes, and displays data spatially. This geographic information system technology integrates common operations on databases, for example, queries and statistical analysis (Sholihin et al., 2022).

The method of delivering information has developed rapidly, with the existence of a geographic information system being the right step to present spatial aspects. In this case, the

Geographic Information System has the benefit of displaying the characteristic form of the earth and collecting data into a database with coordinates according to the analysis carried out. The data displayed is in the form of maps and graphs (Ashari, 2021)

In addition, this geographic information system (GIS) represents various aspects of the real world in digital environmental conditions, starting from various geodesic information on different coordinate systems and ending with unlimited data sets with real-time updates. The technology in this GIS expands the opportunities for real-world digitalization and allows for real-world representation to be used in all types of analysis. The connection of data sets provided by remote sensors with real-time updates allows for the actual situation of every human activity to be visualized (Shkundalov & Vilitiņeņ, 2021).

Several previous studies related to the use of geographic information system applications and websites. Research (Syahputra et al., 2019) based on geographic information system websites produced a system that can provide a map depiction of the distribution of crime points based on data input by the police.

Research (Pasaribu et al., 2019) was based on a geographic information system application. This system is used to search for the nearest car repair shop in the Bandar Lampung area to make it easier for users of repair shop services to find the location of the repair shop, according to their wishes, or to find the nearest repair shop from the user's location. The results of this application are in accordance with user needs in its application, as proven by two testing processes that have been carried out.

Research (S. Santoso et al., 2019) Website-based geographic information system. This system is for the Tangerang City Culture and Tourism Office. Users can see tourist locations and can see the way to the desired tourist location by using a website-based geographic information system. The results can make it easier for users or tourists to find tourist attractions correctly.

Research (Paul & Bussemaker, 2020) is based on a geographic information system application. This web application was developed into a decision support tool for strategic decisions related to waste valorization opportunities, such as determining the location of waste conversion technology, efficient recycling options, and the availability of waste streams as raw materials. The web application can function in addressing future problems in managing waste with increasing waste volumes, the reduction required at landfills, and the complex supply chain associated with waste conversion, assisted by geospatial analysis.

Research (Purnomo et al., 2021) was based on a geographic information system application. The geographic information system application is built using the Laravel framework. The presence of this Geographic Information System in Candi Village can help the community in finding information in the form of news, agendas, and village potential regarding Candi Village.

The purpose of this systematic literature review is to see and know about the utilization of Geographic Information System applications and websites. By looking at various previous literature sources related to the utilization of Geographic Information System Applications and Websites in life.

2. Literature Review

2.1. Geographic Information System

A Geographic Information System is a computer system used to check, analyze data, collect or information related to geography or the earth's surface. Another opinion is that a geographic information system is a computer-based system used to organize, collect, manage, store, manipulate, and display data along with the attributes contained therein (Ansell & Gac, 2022). In this geographic information system must be able to read geographic information. Where in this geographic information must contain appropriate components so that data management and data analysis can be more optimal and also accurate. GIS has four main components, namely spatial components, geographic position components, attribute components, and time components (Ansell & Gac, 2022).

2.2 Web-Based

Web-based GIS is a GIS application created with an internet network base and built on the basis of the client-server architecture concept. With this architectural concept, some

application programs can act as clients/information recipients. However, this web-based architecture cannot limit one-to-one connections, but a client can access many different servers, while its server can be accessed by many different clients. GIS applications running on the internet like this only display digital maps with symbols, legends, colored and attribute tables, provide display function manipulation: zoom-out, zoom-in, and pan and can also run simple query functions without being able to connect directly to the GIS engine, because it must first connect to the web server and its application server (Latif et al., 2020).

2.3 GIS Data Management

In this web-based GIS application, it cannot be separated from the database management system that is inherently attached to it. What makes progress in this field is progress in the GIS application itself. Thus, it can be ascertained that this GIS application technology is internet-based, which does not have a new or separate special spatial type, but uses existing ones that can also be read by desktop-based GIS, such as: ArcView shapefile, table, MIF MapInfo, ArcInfo coverage, DXF / DWG AutoCad, GeoDatabase ArcGIS, and DXF / DWG AutoCad, GeoDatabase ArcGIS. Each of these formats has its own requirements and special features. Thus, any progress in the development of spatial data types will also have an impact on internet-based GIS applications, because the format needs to be accommodated, especially if the format is used as a standard that applies in a community (Latif et al., 2020).

3. Method

3.1 Literature Study Method

In this systematic literature review, the method of literature study is used. Literature study is a research approach that is carried out by searching for references based on theoretical foundations that are relevant to the case or the problems found. These references can be done by searching journals, books, research report articles, and internet sites (Rizky et al., 2022). In this literature study, there are several steps taken to obtain related research data and analyze it. Figure 1 shows the stages of research.



Figure 1. Research Stages

a) Conducting an Article Search

Conducting an international article search using Publish or Perish 7 Scopus and the Scienedirect Website with the keywords "Geographic information system application" and "Geographic information system website" with the search year of the last 5 years, namely 2018-2022. Found 100 articles in the search via Publish or Perish 7 and 30 articles via Scienedirect. Then also conducted a national journal search via Google Scholar. With the keywords "Geographic information system application" and "Geographic information system website", with the search year of the last 5 years, namely 2018-2022. Found as many as 100 articles.

b) Performing Article Translation

Translate international articles in English by first translating the abstract and reading it. Then, after the abstract matches the research, the download process is carried out. Then the entire article is translated using Google Translate.

c) Making Article Selection

In national articles, article selection is carried out by looking at the title of the article and also reading the abstract of the article. After the title and abstract are appropriate, the download process is carried out.

d) Performing Advanced Article Selection

Further article selection is carried out, both international and national articles, by reading the article from the title to the conclusion of the research. Then the article that is appropriate for the research is selected to be used in writing the article.

e) Grouping Articles

Grouping articles that will be used as writing articles for the introduction, previous research, literature review, and discussion. This grouping aims to facilitate writing, entering citations, and references.

3.2 Research Questions

A systematic literature review also uses research questions that aim to keep the researcher focused on the research. Here are the research questions.

- Are GIS applications and websites useful for human life?
- Can GIS applications and websites play a role in the education sector?
- Can GIS applications and websites also play a role in other sectors?

4. Results and Discussion

4.1. Education

In mapping the location of industrial work practice (PRAKERIN), a geographic information system can be used. This research is a website-based system; this system was built to make it easier for students to find out the location of PRAKERIN as well as information about PRAKERIN. The results of this system can make it easier for students who are not familiar with the area or region of the PRAKERIN location to find the location of their PRAKERIN, and with the existence of this PRAKERIN geographic information system, it also makes it easier to get clearer information about the PRAKERIN location and makes it easier to monitor the development of PRAKERIN students while carrying out PRAKERIN (Bakti et al., 2021).

The distribution of real work lecture (KKN) locations can be assisted using a geographic information system. This study aims to develop a geographic information system (GIS) for mapping KKN locations. The GIS developed has been able to provide mapping information for 91 KKN villages, which can be accessed by 281 DPL and 2178 KKN student participants, and can also display the route location to the KKN village location along with the location coordinates of each village (Solekhan, 2013).

For school mapping, a geographic information system can be used; this research is website-based. The aim is to be able to develop a geographic information system for mapping high schools/vocational schools in Malang City so that it can help students find public high schools/vocational schools. There are 10 public high schools and 13 public vocational schools in Malang City. The results can be new student admissions, which aims to make it easier for the community and the Education Office to get information through the website (Fat al Ghozali et al., 2020).

4.2. Tourist

Determining the location of tourist attractions can be helped by using geographic information systems. This research is based on applications. The goal is to be able to display tourist locations in Tanggamus Regency so that tourists can know which locations are closest, what facilities are in the tour, and how many minutes the distance to the destination is, for all tourists to see tourism in Tanggamus Regency, Lampung, based on the Website. The GIS application for tourist attractions in Tanggamus Regency is able to facilitate the process of finding routes to tourist locations in Tanggamus Regency. And help provide tourism information in Tanggamus Regency (Redy Susanto, 2021).

Information about Marine Tourism can be made using a geographic information system. Website-based research. Created to be able to design a geographic information system for marine tourism objects for the Ternate City Tourism Office. This website can help promote marine tourism objects in Ternate City to all people, both local and national. In addition, this website makes it easy for people to find information about Ternate City tourist objects (Umagapi & Ambarita, 2018).

Information media for Religious Tourism can use a geographic information system. This research is based on Web Mobile. It aims to design and build a geographic information system for Religious Tourism so that it can display map images and provide detailed information on religious tourism locations in several sub-districts in Tanah Laut Regency. The results can help the public to access it anywhere and anytime religious tourism locations in several sub-districts in Tanah Laut Regency (Vinandari et al., 2019).

4.3. Health

Mapping the location of health service locations can use a geographic information system; in this study, it is based on Android. Producing an Android-based application for mapping the location of medical services in Way Kanan Regency, which can display a list of information about hospitals, health centers, large clinics, and Lihap maps (Hayatunnufus, 2021).

Searching for health center locations can use a geographic information system. In this study, it is website-based. The goal is to help collect, store, and analyze objects along with geographic data to support decision-making in a mapping plan for searching for a route to the nearest health center to help the community in the Tabanan district. The result is a web-based geographic information system for searching for health center locations in Tabanan district, which is able to display maps with information effectively (Ady Aryanto & Marini Mandenni, 2020).

Mapping the location of Pharmacies can utilize geographic information systems. This research is web-based; the creation of this system is to create a web-based GIS system (WebGis) regarding the distribution of the total number of pharmacies, especially in Bogor City. By using a web-based mapping approach, this system can provide the ability to map all pharmacies with accurate distribution of location information that can help the surrounding community in analyzing or finding the distance of the nearest pharmacy to their place of residence. (Julianti et al., 2018).

4.4. Agriculture

Mapping of tobacco agricultural land can use geographic information systems. This study aims to design and build a geographic information system (GIS) for mapping tobacco agricultural land in Kledung sub-district, Temanggung district, so that it can facilitate the process of searching for tobacco agricultural land according to its type. A GIS that can map tobacco agricultural land according to its type in Kledung sub-district, Temanggung district (Putra et al., 2019).

Land use and food crop production can utilize geographic information systems. The system that will be created is expected to make it easier to see the types of food crop land that already exist and those that do not yet exist in a sub-district. The application of a geographic information system has the benefit of providing information on the location of the sub-district of Kediri Regency and knowing several types of crop land in the sub-district, and can provide information on the production of the harvest from each sub-district (Septya & Pradana, 2019).

Mapping of agricultural land and harvest commodities using geographic information systems. This research is website-based. The geographic information website (GIS) for mapping agricultural land and harvest commodities in Sidrap Regency, based on the web, makes it easier to handle the process of recording agricultural data and production results, with monitoring system data collection, and also validation of data reported by the admin (extension worker) (Antonius, 2022).

4.5. Transportation

Road project monitoring and information using geographic information systems. This research aims to design and develop application programs that can provide information about road projects in more detail and informatively, and can be easily accessed by the public. The results can increase public awareness while facilitating the capacity of the department for growth and development (Landicho, 2018).

Road section damage information can utilize geographic information systems. This research is website-based. In this research, the Public Works Department of Serang Regency still has difficulty in presenting spatial data information in the form of digital maps, still has difficulty in maintaining road condition data, and also, road condition data has not been published, so that the general public has difficulty in obtaining information about the condition of the road. The presence of this GIS application, it can facilitate the performance of the PU Department in presenting road damage information to the general public (Lauryn et al., 2019).

Routes on public transportation can utilize geographic information systems. This study aims to utilize internet technology to build a geographic information system that can contribute to providing convenience for the public in getting public transportation routes, a web-based geographic information system that can be used to facilitate the public in getting

information on public transportation routes in Depok City. The results of this system, which was built, are equipped with visualization of route maps, information on areas passed through, fares, distances, and travel times. This information can be an added value of the system created (Pohan & Setianingrum, 2019).

4.6. Business

Information about distro stores can utilize geographic information systems. This study has built a geographic information system for mapping distro stores based on a website that can provide information about distro locations to the public about distro stores in them with map visualization. The results of this system can provide convenience for the public as users in receiving information about distro stores in Bandar Lampung (Ikhsan et al., 2020).

In mapping laundry user partners, using a geographic information system produces a geographic information system. This study aims to help map laundry application user partners at PT Tenten Digital Indonesia. The results of the system created can help PT Tenten Digital Indonesia marketing to provide a database of laundry business information that has the potential to become a partner (H. Santoso, 2020).

In determining the location of MSMEs, geographic information systems can be utilized. This research is application-based. The system was developed so that the MSME location search information system in the Jepara district can make it easier for the general public to search for and find out the location of the targeted industry. The result is a geographic information system for searching for MSME locations in the Jepara district, so that it can be useful for industry players in introducing their industrial locations and the general public in finding industrial locations in Jepara easily and quickly (Azizah & Widiastuti, 2019).

4.7. Natural Disasters

Earthquake Analysis and Monitoring (SIGAP) utilizes geographic information systems. This research is web-based. The aim is to create an earthquake and natural disaster information system that can be used by the community or government as a reference for carrying out preventive processes before the disaster becomes more serious or spreads to other locations. The information system in its use will not only be used by the community to search for geographic information on earthquakes in Indonesia, but also throughout the world, even the geographic information system can be implemented on an application platform in the form of a website to increase public awareness of the impact of earthquakes and how to deal with them (Fahrizal & Wahyu Wibowo, 2022).

Disaster victim evacuation points can utilize geographic information systems. This research is web-based. This system was created to help the government, community, and volunteers related to handling natural disasters, and to know the distribution of refugees, the number of post capacities, and also the types of assistance needed by refugees. The results are based on the geographic information system created; it is considered feasible and can be implemented based on the results of the tests that have been carried out (Azwar et al., 2020).

Mapping of collapsed well disaster locations using geographic information systems. This research is web-based. This research aims to create an information system that can map the location of collapsed well disasters with accurate positions. The results of this system can display data on the distribution of collapsed wells that occurred in the Manggis Village area, Puncu sub-district. In addition, this system also helps to facilitate officers in processing and analyzing disaster incident data (Dianta & Souvenirs, 2018)

5. Conclusion

In the utilization of geographic information system applications and websites can be used in various sectors that help facilitate human activities and needs. Such as, the field of education can map the location of industrial work practice locations (PRAKERIN), the health sector can map the location of Pharmacies, the transportation sector can provide information related to routes on Public Transportation, and other fields. The conclusion of this study is the utilization of geographic information system applications and websites that can be used which can help human activities and needs in various sectors.

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References

- Ady Aryanto, I. K. A., & Marini Mandenni, N. M. (2020). Web-based geographic information system for the location of health centers in Tabanan Regency. *JTIM: Journal of Information Technology and Multimedia*, 1(4), 294–301. <https://doi.org/10.35746/jtim.v1i4.70>
- Ansal, S. D. D., Hutagalung, J. E., & Rohminatin. (2021). Geographic information system for distribution of livestock point locations at the Asahan Regency livestock service. *Journal of Technology and Information Systems*, 1(2), 1–5. <https://doi.org/10.33330/jutsi.v2i1.1153>
- Ansell, T., & Gatlif, J. (2022). Implementation of geographic information system in visualizing air quality level in Jakarta in real time based on web. *Journal of Technology*, 8(2), 2115–2125.
- Antonius, S. P. P. (2021). Geographic information system of land use and food crop production in Kediri Regency, East Java. *Journal of Informatics Engineering Students*, 2(1), 229–235.
- Ashari, T. (2021). Selection of clinic development location using analytical method. *Journal of Information Technology*, 03(02), 14–19.
- Azizah, N., & Widiastuti, N. A. (2019). Implementation of geographic information system for searching MSME locations in Jepara Regency. *Journal of Informatics and Software Engineering*, 1(1). <https://doi.org/10.36499/jinrpl.v1i1.2768>
- Azwar, A., Hamria, H., & Kasiati, I. S. (2020). Geographic information system for searching for evacuation points for natural disaster victims in Boalemo Regency. *Simtek: Journal of Information Systems and Computer Engineering*, 5(1), 6–11. <https://doi.org/10.51876/simtek.v5i1.65>
- Bakti, I. R., Bunda, Y. P., & Utari, C. T. (2021). Design and construction of a web-based geographic information system (GIS) for industrial work practice (Prakerin) locations of Medan Methodist Vocational School. *Rabit: Journal of Technology and Information Systems Univrab*, 6(1), 1–6. <https://doi.org/10.36341/rabit.v6i1.1505>
- Dianta, A. F., & Cinderatama, T. A. (2018). Development of a web-based geographic information system for mapping the location of collapsed well disasters in Kediri Regency. *Proceedings of the International Conference on Information Systems*, 5, 1011–1016.
- Fahrizal, M. A., & Wahyu Wibowo, A. P. (2022). Geographic information system for earthquake analysis and monitoring (SIGAP). *Journal of Information Technology*, 4(1), 31–34. <https://doi.org/10.47292/joint.v4i1.74>
- Fat al Ghozali, M., Achmadi, S., & Zulfia Zahro', H. (2020). Utilization of geographic information systems for mapping of high schools/vocational high schools in Malang City based on web. *JATI: Journal of Informatics Engineering Students*, 4(2), 230–238. <https://doi.org/10.36040/jati.v4i2.2690>
- Hayatunnufus, H. (2021). Android-based geographic information system for health services in Way Kanan Regency. *Data Portal Journal*, 8(2), 1–20.
- Ikhsan, A., Najib, M., & Ulum, F. (2020). Geographic information system of distro stores based on web-based ratings of Bandar Lampung City. *Journal of Technology and Information Systems (JTIS)*, 1(2), 71–79.
- Julianti, M. R., Budiman, A., & Patriosa, A. (2018). Design of a web-based geographic information system for mapping pharmacy locations in Bogor City. *Jurnal Sisfotek Global*, 8(1), 13–19.
- Landicho, J. A. (2018). Web-based geographic project monitoring and information system for highways and roads. *ScienceDirect*, 5, 252–261.
- Latif, N., Awaliah, N., & Markani. (2020). Implementation of web-based geographic information system for public services in Pare-Pare City. *Scientific Journal of Computer Science*, 6(2), 55–59. <https://doi.org/10.35329/jiik.v6i2.157>
- Laury, M. S., Ibrohim, M., & Study, P. (2019). GIS road section damage level. *Journal of Technology*, 6(1), 20–31.
- Pasaribu, A. F. O., Darwis, D., Irawan, A., & Surahman, A. (2019). Geographic information system for searching for car workshop locations in Bandar Lampung City. *Jurnal Tekno Kompak*, 13(2), 1. <https://doi.org/10.33365/jtk.v13i2.323>
- Paul, M., & Bussemaker, M. J. (2020). Cleaner production journal of municipal waste management decision-making in the UK. *Machine Translated by Google*, 263, 1–11.
- Pohan, A. B., & Setianingrum, H. W. (2019). Rapid application development method in web-based geographic information system of Depok City public transportation routes (SIGEPOK). *PIKSEL: Computer Science Research Embedded and Logic Systems*, 7(2), 187–198. <https://doi.org/10.33558/piksel.v7i2.1826>

- Purnomo, A., Iswahyudi, C., & Lestari, U. (2021). Application of geographic information system for village potential management in Candi Village, Boyolali Regency based on web application. *Script*, 9(1), 15–22.
- Putra, S. S., Susilo, G., & Sundari, C. (2019). Geographic information system for mapping tobacco farming land in Kledung District, Temanggung Regency. *TRANSFORMASI Journal (Information & Development of Science and Technology)*, 15(2), 97–105.
- Redy Susanto, E. (2021). Geographic information system (GIS) of tourist attractions in Tanggamus Regency. *Journal of Technology and Information Systems (JTIS)*, 2(3), 125–135.
- Rizky, M., Islam, U., Syarif, N., Jakarta, H., Islam, U., Syarif, N., & Jakarta, H. (2022). Utilization of artificial intelligence in facing the Covid-19 pandemic: Systematic literature review. *Journal of Artificial Intelligence*, 05(01), 46–52.
- Santoso, H. (2020). Geographic information system mapping of laundry application user partners at PT Tenten Digital Indonesia based on web and mobile. *Sistemasi*, 9(3), 457. <https://doi.org/10.32520/stmsi.v9i3.850>
- Santoso, S., Ilamsyah, I., & Abilaji, R. (2019). Tangerang City tourism location guide with web-based geographic information system. *Journal of Information Systems and Informatics (Simika)*, 2(1), 91–101. <https://doi.org/10.47080/simika.v2i1.335>
- Septya, A., & Pradana, P. (2019). Food crop production in Kediri Regency, East Java. *JATI: Informatics Engineering Student Journal*, 3(2), 9–15.
- Shkundalov, D., & Vilitiėnė, T. (2021). Automation in construction: Bibliometric analysis for building information modeling, geographic information systems, and web environment integration. *Journal of Construction Automation*, 128(2001), 1–15.
- Sholihin, M., Informatics, T., Engineering, F., Lamongan, U., & Geography, S. I. (2022). Implementation of Dijkstra's algorithm in system applications. *Journal of Computational Applications*, 7(1), 546–550.
- Solekhan, M. (2013). Implementation of geographic information systems. *Humanoria UGM Yogyakarta*, 11(1), 52–89.
- Syahputra, E., Widiartha, I. B. K., & Zubaidi, A. (2019). Design and construction of a web-based geographic information system for mapping crime-prone areas in Mataram City. *Journal of Informatics Management and Information Systems*, 2(2), 39. <https://doi.org/10.36595/misi.v2i2.102>
- Umagapi, D., & Ambarita, A. (2018). Geographic information system of marine tourism at the Ternate City tourism office. *Scientific Journal of ILKOMINFO - Computer Science & Informatics*, 1(2), 59–69. <https://doi.org/10.47324/ilkominfo.v1i2.8>
- Vinandari, N., Hafizd, K. A., & Noor, M. (2019). Geographic information system of religious tourism based on mobile web. *Journal of Science and Informatics*, 5(1), 41–49. <https://doi.org/10.34128/jsi.v5i1.161>.