

Cemetery Database Development for Masjid Asy-Syuja'ah Merlimau, Melaka

Ahmad Yusof B. Sahdan^{1*}, Azrina Binti Zolkifli¹, Hasan B. Yusop@Talip¹

¹Department of Civil Engineering, Politeknik Merlimau Melaka, Malaysia.

ABSTRACT

Cemeteries are typically situated adjacent to mosques or suraus and serve as designated burial grounds for the deceased. In this context, a cemetery database system was developed for Masjid Asy-Syuja'ah in Merlimau, Melaka using ArcGIS Online and ArcGIS Pro. Field data collection and measurements were conducted using conventional survey methods, while attribute data were simulated. The system is capable of visualising spatial information such as grave locations, along with attribute data of the deceased, including name, age, date of birth, date of death, and gender. This system facilitates the cemetery management of Masjid Asy-Syuja'ah in systematically and efficiently accessing, storing, and managing burial records. The objective is to provide an efficient, systematic, and accessible solution for cemetery management, facilitating digital record-keeping, data retrieval, and visualization via interactive mapping tools. The integration of spatial data and GIS technology enhances operational efficiency and supports community access to burial records. Furthermore, the system supports spatial and attribute data analysis through interactive maps and a structured database.

Keywords: Cemetery management, database system, digital record and spatial information

1. INTRODUCTION

A cemetery is a place designated for burying or placing the bodies of the deceased underground. The cemetery area of Masjid Asy-Syuja'ah Merlimau has existed since 2006. Since it was first used as a wakaf burial ground until now, many issues have been identified before this study was carried out. Among the problems reported by the mosque management is the method of data storage, specifically the recording of information about the deceased. Typically, this recording process is done manually using a death register book to store the information of the deceased buried in this cemetery. The manual recording method is prone to loss or destruction in the event of a disaster. Therefore, it is essential to digitalize the data so it can be stored securely, permanently, and systematically.

The 2013 Muzakarah Falak, organized by the Department of Islamic Development Malaysia (JAKIM) and the Pahang Islamic Religious Department (JAIP), held from August 27 to 29, 2013, issued fifteen (15) resolutions, two (2) of which touched on this topic [7]. The Muzakarah agreed that cemetery management should be strengthened by standardizing the direction of the Qibla and creating guidelines for cemetery management, including the preparation of a course module for cemetery management for mosque committees and the local community. Furthermore, the Muzakarah agreed that a database or record of cemeteries should be created, including information such as reference numbers and cemetery coordinates, as well as details about the name, photo, time, and date of death.

*triodgupmm2024@gmail.com

The management of cemetery records is an important aspect of administrative responsibility within the Muslim community, particularly for institutions such as mosques that oversee and maintain burial grounds. Traditional methods that rely on manual record-keeping—such as logbooks, hand-drawn maps, and physical documents—often face various issues, including data loss, recording errors, and difficulties in retrieving or searching for information [12].

Masjid Asy-Syuja'ah in Merlimau, Melaka, is one such mosque that oversees a local cemetery serving the surrounding Muslim community. However, the current method of managing burial records at the mosque is primarily paper-based, which presents challenges in terms of data accuracy, accessibility, and long-term preservation. As the number of burials increases over time, the need for a structured, reliable, and user-friendly database system becomes increasingly vital. This study aims to develop a digital cemetery database system for Masjid Asy-Syuja'ah that will enable efficient storage, management, and retrieval of burial information. By transitioning from manual to digital record-keeping, the mosque will benefit from improved operational efficiency, enhanced data security, and better service to the community. The project also seeks to provide a model that could be replicated by other mosques facing similar administrative challenges.

The advancement of information technology and the internet is increasingly apparent in various aspects, one of which is Geographic Information System (GIS). GIS is seen as an approach that can play an important role in managing the environment through various techniques and analyses, thus providing answers in spatial and attribute analysis. GIS's ability to help administrators understand environmental changes involving spatial questions and make accurate, clear, and effective decisions has made it increasingly popular. With the advancement of information technology, various studies have been conducted to develop digital cemetery management systems. According to Ahmad et al. [11], the use of database systems in cemetery management can enhance the efficiency of data access, simplify the process of updating records, and preserve data integrity over the long term. Digital systems also allow for the search of grave locations using geolocation (GPS) and can be integrated with interactive maps, such as those implemented in the e-Cemetery system by the Ipoh City Council (Majlis Bandaraya Ipoh, MBI). Furthermore, the use of Geographic Information Systems (GIS) in cemetery management has proven effective in helping administrators accurately and systematically identify grave locations [14]. However, most existing systems are developed by local authorities and are not yet tailored to the specific needs of smaller mosques or rural communities. Studies such as Rahman et al. [13] have also highlighted the importance of user-friendly interfaces in cemetery management system development to ensure ease of access and usability, particularly for mosque staff who may lack a strong technical background.

The next issue concerns information retrieval and analysis. Based on interviews with the mosque management, they reported difficulties in searching for information when heirs or relatives of the deceased inquire about the location of the grave. Therefore, with the development of a cemetery database using the ArcGIS application, this can help solve problems related to record-keeping and the digital storage of data, as well as facilitate information retrieval through interactive maps on smartphones. This study is conducted to make it easier for the cemetery management or the public to access geolocation information and the plot details of graves at the Masjid Asy-Syuja'ah cemetery through gadgets. The data collected, which forms the database and is integrated with ArcGIS, enables this information system to support management aspects, increase efficiency, save time and costs, and simplify operations.

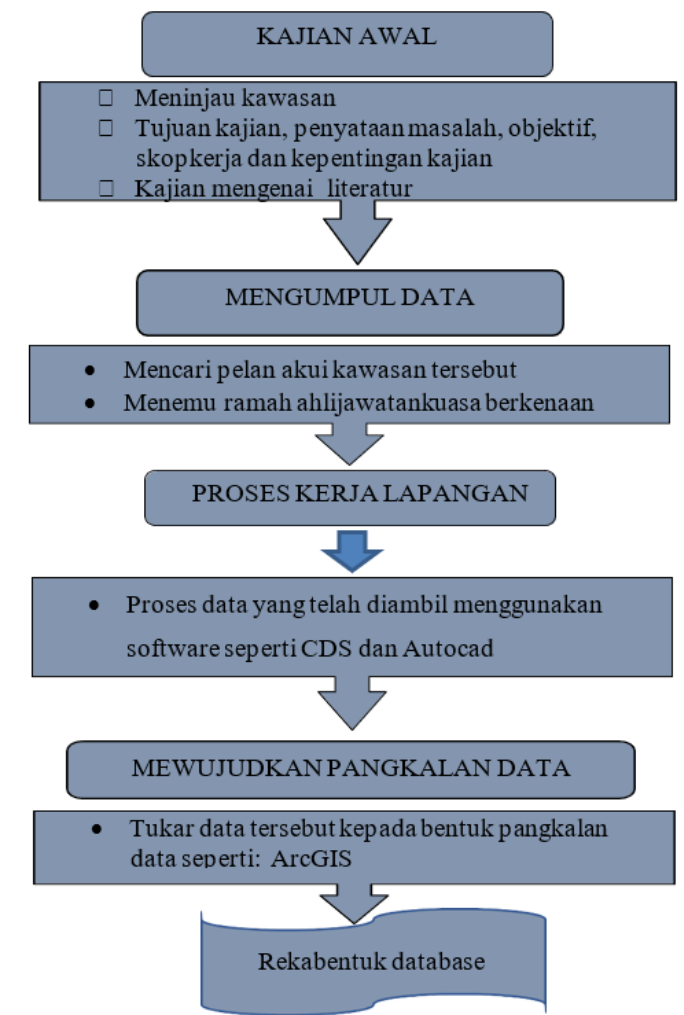


Figure 1. Study Location

This study is conducted to make it easier for the cemetery management or the public to access geolocation information and the plot details of graves at the Masjid Asy-Syuja'ah cemetery through gadgets. The data collected, which forms the database and is integrated with ArcGIS, enables this information system to support management aspects, increase efficiency, save time and costs, and simplify operations.

2. METHODOLOGY

Overall, this study is based on data collection in the field to determine geolocation. **Figure 2** shows the flowchart of this study's methodology.



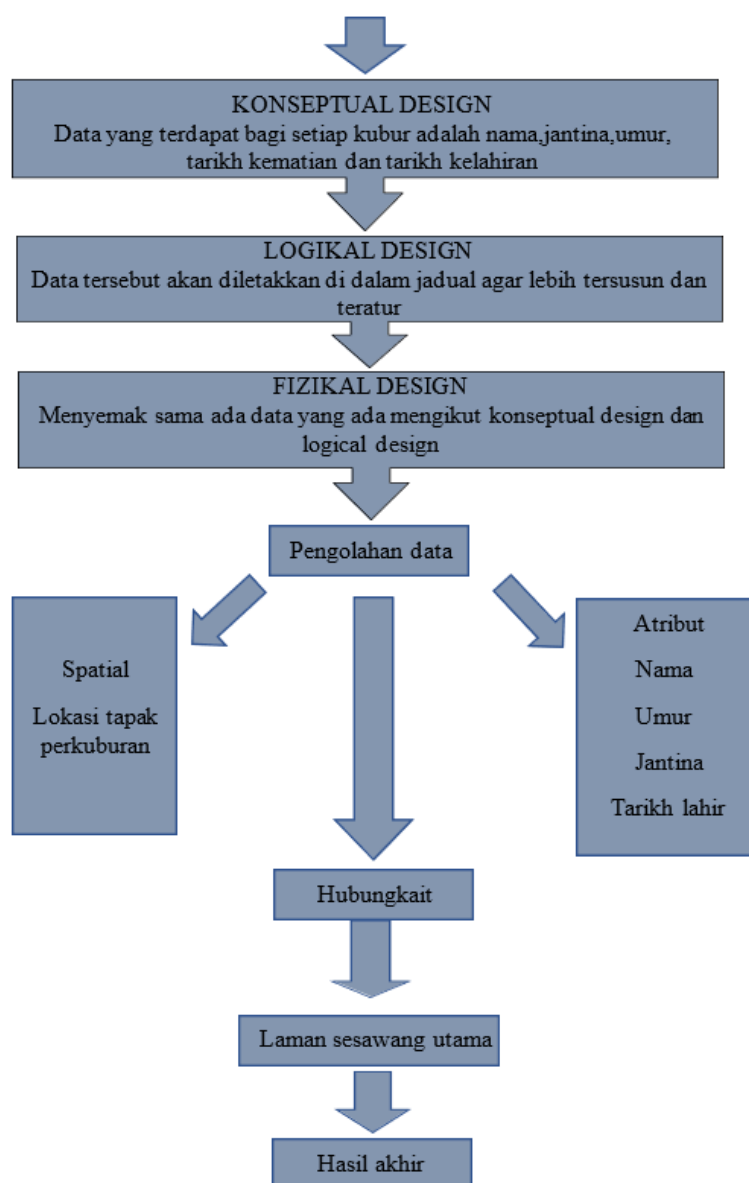


Figure 2. Study's Methodology

Next, the spatial and attribute data are processed using ArcGIS software, as shown in **Figure 3**. All the data and information collected are organized based on the results of a preliminary study that was conducted beforehand.

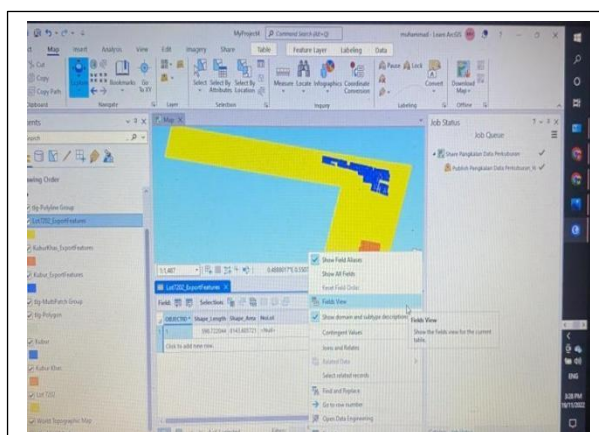


Figure 3. Data Attribute Entry Fields

Spatial data refers to the plot layout that has been created using AutoCAD software and exported to ArcGIS through the software's menu, as shown in **Figure 4**.

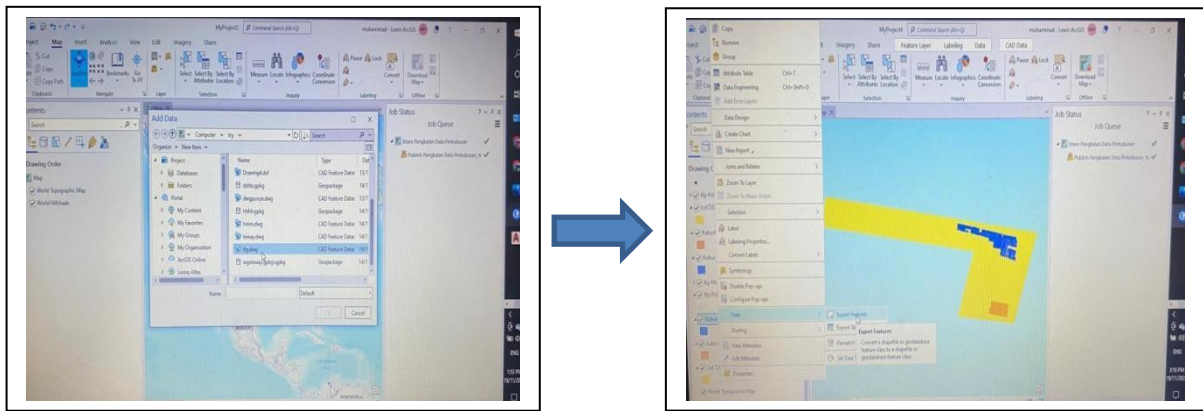


Figure 4. Exporting Spatial Data

Spatial data and attribute data are combined using ArcGIS software. The processed and analyzed data will then be uploaded onto a website through ArcGIS Online. Following that, web editing is done according to suitability and creativity, as shown in **Figure 5**. Finally, Google Sites is used to launch the database system.

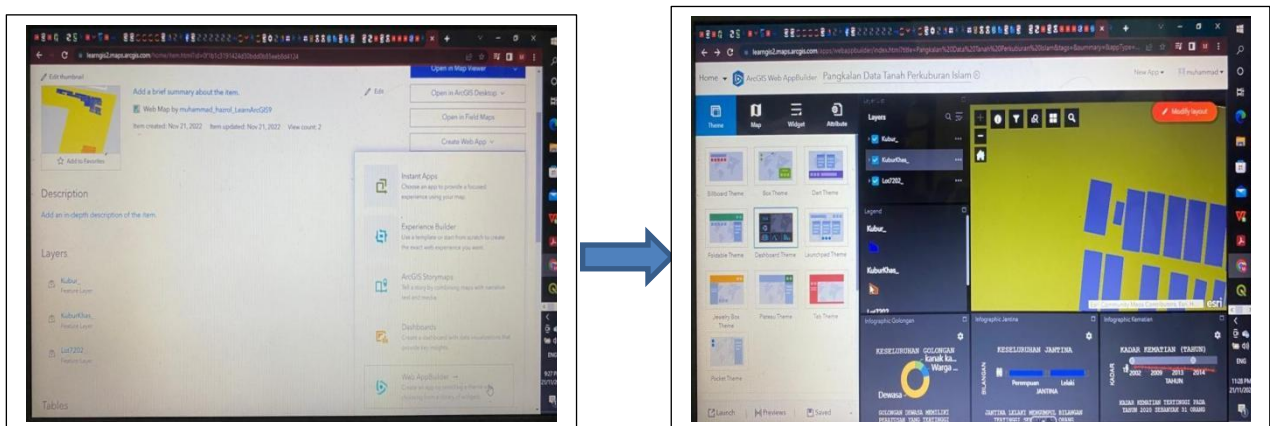


Figure 5. ArcGIS Online Website

3. RESULTS AND DISCUSSION

Overall, the system developed covers three main aspects: the collection of spatial data, the collection of attribute data, and the creation of a website through ArcGIS Online. All these aspects are integrated into a single database. The data that has been processed will be stored in an online database using ArcGIS Online. The data, once launched using Google Sites, allows users to search for and access information related to the graves. All data stored in ArcGIS can be displayed interactively on the cemetery database system's website, as shown in **Figure 6**. This information system is capable of displaying details about the deceased, for example, showing the location, grave data such as name, age, gender, date of birth and death, type of grave, the deceased's group, heirs' names, and heirs' phone numbers.

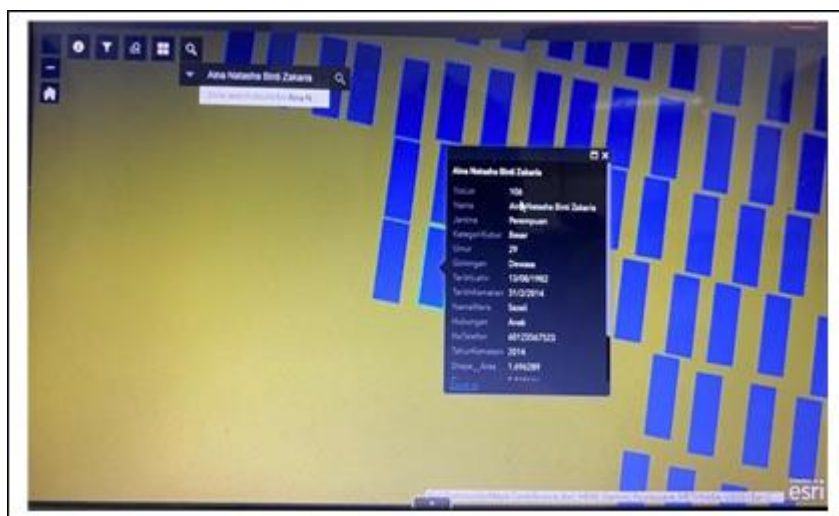


Figure 6. Display of Grave Information

Additionally, this system can also perform analyses to help cemetery management understand data by gender, as shown in **Figure 7**, and the group classification of the deceased, as shown in **Figure 8**.



Figure 7. Gender-based Analysis

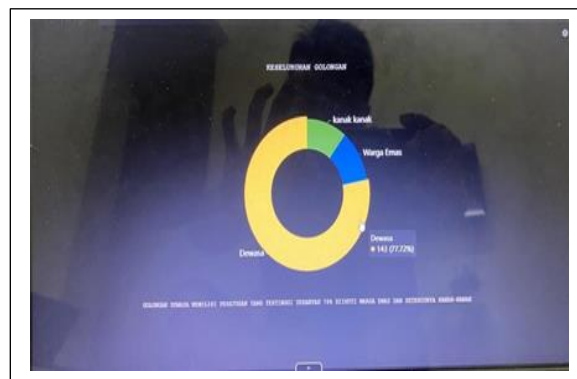


Figure 8. Group-based Analysis

The system also allows for an analysis of annual death rates, which can be seen through this system as shown in **Figure 9**. This is important to understand the causes of death during a particular year, such as infectious diseases (COVID-19), and so on. Furthermore, death rate projections can also be made through this system, as shown in **Figure 10**. This projection analysis helps the management take proactive actions concerning land usage duration to accommodate the number of deaths and strategies that can be implemented to optimize costs.



Figure 9. Death Rate Analysis

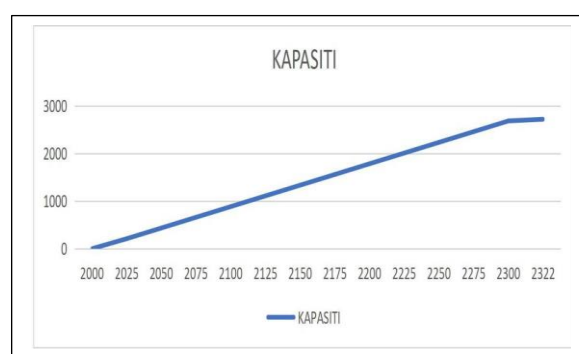


Figure 10. Land Usage Projection Analysis

Suggestions for this system include adding more information about the deceased (attribute data) to allow for more extensive analyses and searches through data matching. In addition, a more user-friendly display on the website is crucial to ensure that the system can be easily accessed. While it can be accessed through gadgets or smart devices, not all devices are suitable, as they require high internet coverage and devices capable of accessing it. The integration of spatial data and device location could also be implemented as an improvement to this system, as developed by Noradila Rusli [6], who created the Geo-Pusara application to guide visitors to the location of a grave using a smart device. This would be particularly useful for large cemetery areas. Lastly, the ArcGIS software itself, used in this study, only employed a trial license with a limited usage period. For more advanced and serious stages, a licensed software version is required to protect the rights of developers and users.

4. CONCLUSION

The increasingly accessible and advanced GIS application today is found to be useful in facilitating the management of cemeteries, as it has been used in developed countries such as Canada, the United States, and the United Kingdom. The widespread use of GIS has proven to help improve weaknesses in the management, administration, and operations of the Masjid Asy-Syuja'ah cemetery. Therefore, it is essential to raise awareness among all parties about the importance of information technology development today and to recognize its role in providing numerous benefits to various stakeholders. This system is easier and more comprehensive because it is more focused on its information. This is because the system integrates both attribute and spatial data. As a result, the public can access and perform their own searches without having to refer to the cemetery management, as was often the case previously. The system also enables the saving of files and space. It is clear that the developed system can enhance the efficiency and governance of Masjid Asy-Syuja'ah cemetery. Technology today has the capability to change the way the public interacts with maps and discover new ways to utilize mapping technology. The cemetery industry also requires a new shift to improve its image in line with religious demands.

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