



CHAPTER II

Literature Review

2.1 Introduction

Digital information boards are a media that can be used as a means for sharing information, digital information boards are often found in public places so that there are many people who can see it, this digital information board can be anything like information sales of goods, information from the government such as the activities of the official while he was in office, information road repairs. This information board can be the official media of an agency and can be used strategically because it can be seen by many people so it becomes very strategic for its users. Currently, places of worship are also starting to implement the use of digital information boards media for distributing information, but many of the information boards used are usually not used properly effective due to limitations either on the part of the mosque management or the manufacturer of the goods.

Example, mosque administrators create uninteresting information so that the congregation is not interested and also the form of digital information boards is not good and also the information content is limited, if from manufacturers, most manufacturers limit the information that can be displayed so that this tool is only used limited to a device for notifying prayer and religious schedules, and there is no information about mosque activities or something else. This makes this information board less interesting to look at because the information is limited. In this research, I will discuss the side of the goods maker or producer of this goods, because there are many limitations or restrictions by producers due to copyright and security reasons here. I am The author intends to create an information board that is easy and can be customized according to desired needs by the customer and can be applied easily and with a minimum of tools at the lowest possible cost.



2.2 Explanation of key terms and terminology

○ Digital

Digital refers to electronic technology that processes and stores data using discrete binary digits, typically 0 and 1. This term is commonly used in computing and electronics, where real-world information is converted to binary numeric form (Weller, 2012). Digital data is represented as a string of 0s and 1s, contrasting with analog data, which is represented by a continuous range of real numbers. Digital technology has various applications, including digital media, digital recording, and digital electronics.

○ Digital Media

Digital media refers to mediums of digitized information broadcast through a screen and/or a speaker. This includes text, audio, video, and graphics that are transmitted over the internet for viewing or listening to on the internet. Digital media platforms, such as YouTube, Vimeo, and Twitch, have accounted for significant viewership rates. (Coleman, 2010) It encompasses a wide array of content types, such as digital images, digital video, video games, web pages, social media, digital audio, electronic documents, and electronic books.

- **Accessibility:** Digital media is accessible to anyone with an internet connection. This means that people from all over the world can access the same information and resources.
- **Affordability:** Digital media is often more affordable than traditional media. For example, you can watch online videos for free, and you can download e-books and audiobooks for a fraction of the price of a hardcover book.
- **Interactivity:** Digital media is interactive, which means that users can engage with the content in a meaningful way. For example, you can comment on blog posts, share articles on social media, and play online games.



- **Portability:** Digital media is portable, which means that you can take it with you wherever you go. You can watch movies on your phone, listen to podcasts on your commute, and read e-books on your Kindle.
- **Updatability:** Digital media can be updated in real time, which means that you can always access the latest information. This is in contrast to traditional media, which can be out of date by the time it reaches you.
- **Greater Opportunities for Creativity:** Digital media tools enable individuals to express themselves creatively in new and exciting ways. Platforms like YouTube, Instagram, and TikTok offer avenues for sharing music, art, photography, writing, and other forms of creative expression with a global audience. Digital tools like editing software and animation applications also empower individuals to create professional-quality content without the need for expensive equipment or studios.

Digital media has had a significantly broad and complex impact on society and culture, transforming various aspects of communication, commerce, and entertainment. "Digital media are the tools that allow us to create, share, and consume information more easily than ever before. They are democratizing the media landscape and giving everyone a voice." (Muhajirin & Daryono, 2018)

- **Digital signage**

Also known as electronic signage, refers to the use of display technologies such as LED walls, projection, LCD monitors, and other digital display boards to display various types of content, including text, audio, video, and graphics. It is a form of digital media that relies on electronic devices for its creation, distribution, viewing, and storage. Digital signage is used in various settings, including public



spaces, transportation systems, retail stores, corporate spaces, and restaurants, to provide wayfinding, messaging, marketing, and outdoor advertising. (Want & Schilit, 2012) describes digital signage as “a network digital, electronic displays that are centrally managed and individually addressable for displays of text, animated or video messages for advertising information entertainment, and merchandising to targeted audiences”. OR “Digital Signage is provides dynamic real time, near real time, or non real time information that may be individually adapted to the location, time, situation and who is actually watching the screen. Using simultaneous screen elements such as regions, layer and tickers (or “crawlers”), several messages, originating from different sources (and places), may be combined on one single screen. Thought providing information in fully automated way, medium also allows for inter action with view, using touch screens or other means of user control” As (Schaeffler, 2012)author, Digital Signage Broadcasting : Broadcasting, Content Management and distribution Techniques.

• Digital signage as information media

A digital notice board (digital signage) is a one-way digital-based information service. The effectiveness of digital signage is greatly influenced by the message delivery strategy. This service is usually used in several strategic places and where crowds of people are. Digital Signage is a medium that conveys a targeted message (narrowcast), which is different from television media, which conveys a message widely (broadcast)(Fadli et al., 2020a). This narrowcast concept will ultimately influence how message delivery strategies are applied to digital signage. This digital signage utilizes flat screen technology such as LCD, LED or plasma which is projected to display multimedia content. Several advantages of using digital signage compared to using fixed advertisements:



- **Real-time updates:** Content can be updated instantly, ensuring viewers have access to the latest information and reducing the risk of outdated information being displayed.
- **Targeted messaging:** Content can be tailored to specific audiences and locations, allowing for targeted communication and maximizing the impact of information campaigns.
- **Enhanced communication:** Digital signage provides a more effective platform for communicating information compared to traditional methods, leading to increased awareness, understanding, and engagement.

Digital signage refers to electronically controlled signs that can be updated quickly, at low cost, and the message can be sent to a display or many displays at the same time.

- **Digital information boards as information media for mosques**

This information board can be used as a valuable tool or asset for the mosque, because as has been explained, this digital information board functions as a means of communication and engagement with the mosque community which functions as an official means for the mosque to provide information to the mosque community and to the worshiper who will attend. praying at the mosque, however, this mosque information board can improve relations between the worshiper, community and mosque apparatus because we can see what activities will be held by the mosque and its community, such as:



- **Event announcement**

This digital information board can function as an announcement board that can report on mosque activities this week and as an official mosque information board and can be changed as needed.

- **Information on hadith and holy verses of the Quran**

This digital information board can also contain hadiths and short verses which can be used as educational material to increase religious information and also increase awareness of religious communities.

- **Educational content**

This information board can also contain short Islamic lessons such as stories of the prophet, biographies of Islamic figures and can also include animations in the form of videos.

- **As a guide to prayer times**

This digital information board has the main function as a guide to prayer times and also as a guide to actual times and there are other functions as well, such as instructions that cannot be done in the mosque, such as sleeping in the mosque and mosque rules.

2.3 Reviewing of relevant literature and technologies

Digital signage is a management system that controls the digital display that carries signage (Kelsen, 2012). In other words, this system will replace traditional signage or static signage like posters and billboards into a digital display. Unlike over-the-air broadcasts on television, digital signage systems have more specific definitions.



A system that sends a variety of content simultaneously to each display that may have the same or different content for each display. The possibility of this signage transition has been demonstrated through the revenue statistics of signage companies in the developed countries, in the period from 2007 to 2010 has experienced an increase of 6 times as a result of switching to digital signage (Schaeffler, 2008). Several developed countries have been ready to implement this system, with proven ease of finding digital displays both indoor and outdoor in various public areas. (Yin, et.al., 2012).

Digital Signage is a digital menu processing application that is programmed to display information or messages to targets effectively, quickly, accurately and reliably (Want & Schilit, 2012). With a system consisting of a composition of servers or personal computers (PCs), monitors and Digital Signage software become more efficient in terms of time and cost (Suyanto, 2004). Research on Digital Signage in the field of commercial intelligence demonstrates customer interest in advertising (Bauer et al., 2011)

Digital signage has evolved into a highly efficient, appealing means of providing multimedia content for business owners, brand marketers, and advertising agency, who realize its benefits of informing, promoting, and entertaining specifically targeted consumers. The days of providing static content are behind us. According Tom Perchinsky, CEO, Adek Corporation.(Prinyavitit et al., 2020)

Digital display may involve multiple sets of images that are displayed on the same screen at the same time, and broadcast or multichannel TV content may be part of that. Indeed, digital signage images emanate from numerous sources at the same time, such as a broadcast, cable, or satellite signal, and mix on the same screen, at the same time, together with photo images, or data, animation, or other video images via signals sent from a computer or server, close by or far away. One of the wonders of digital signage is the pure and unbridled flexibility of the content that can be delivered to the medium(Assegaf et al., 2021). Where TV involves real-time content, the digital signage display features content that can be live (or “real-time”), as well as other content that is not live and is stored somewhere in a



form of memory. to Further, although broadcast-oriented TV content is usually created at and delivered from one or more TV stations, the content delivered to digital signs comes concurrently from many different files, and sometimes, many different places. Inasmuch as the audience for TV shows typically finds itself sitting, the same audience for digital signage content tends to be more active and mobile. And finally, TV involves but one protocol, form, and stream to carry both ana-log and digital TV, whereas digital signage offers users a great variety of protocol, forms, and displays. Digital signage offers this flexibility and variety primarily vital foundation as a medium built around an Internet Protocol TV (IPTV) format. (Patil et al., 2020).

2.4 Review the development and applicability of appropriate and current ideas, method and product relevant

- My SQL as a database

MySQL is a popular open-source relational database management system used for managing and organizing data. PHPMyAdmin is a free, open-source software tool written in PHP, designed to handle the administration of MySQL and MariaDB databases over the web. It allows users to perform a wide range of operations on MySQL and MariaDB, such as managing databases, tables, columns, relations, indexes, users, and permissions. PHPMyAdmin also provides a user interface for directly executing SQL statements, making it easier for users to interact with their databases.

- PHP

PHP is a general-purpose scripting language geared towards web development. It is especially suited to server-side web development, running on a web server to create dynamic web page content or dynamic images. PHP can also be used for command-line scripting and client-side graphical user interface. It is widely supported by web hosting providers, runs on various platforms, and is compatible with many relational database management systems (Siame & Kunda, 2017). PHP is free to download and use, and its source code is available for users to customize



and extend for their own use. Originally designed to create dynamic web pages, PHP now focuses mainly on server-side scripting.

- CodeIgniter As Framework

CodeIgniter is an open-source, rapid development web framework for building dynamic websites with PHP. It is based on the model-view-controller (MVC) development pattern, where controller classes are necessary, but models and views are optional. CodeIgniter is known for its speed compared to other PHP frameworks and can be modified to use the Hierarchical Model View Controller (HMVC) pattern (Karthik S & Mn, 2022). It provides a small footprint, a rich set of libraries for commonly needed tasks, and a simple interface and logical structure to access these libraries. CodeIgniter is well-documented and is designed to enable developers to build projects faster by minimizing the amount of code needed. It is widely used for developing full-featured web applications and is suitable for developers who need a simple and elegant toolkit. CodeIgniter is currently in version 4, with a major focus on modern PHP features and improved performance. It continues to be a popular choice for developers who value simplicity, security, and performance in their web applications. Overall, CodeIgniter remains a powerful and elegant web framework for PHP developers who prioritize simplicity, security, and performance. If you're looking for a framework that's easy to learn and use, CodeIgniter can be a great option for your next web project.

- AGLIE Method

Agile is a set of software development methods that are carried out in stages and iteration. Agile development is often referred to as a framework because it contains various methods that can be used as needed. We will discuss this further below. Each iteration in Agile also varies in duration, depending on the project you are working on and the method used. However, iterations generally run between one and four weeks. Iterations in Agile focus on rapid software



development efforts according to changing customer needs by involving all teams. Sommerville (Dingsøyr et al., 2010) argues that the agile method is an incremental development method that focuses on rapid development, software that is released gradually, reducing process overhead, and producing high-quality code and in the development process involves customers directly. (Mahendra & Eby Yanto, 2018) For example, you are developing a map application. Then, suddenly there is a pandemic that raises new needs in the community about updated virus distribution information. Well, with the Agile method, you can adapt by adding a pandemic (Muqorobin & Rozaq Rais, 2022) distribution map feature in the next iteration. In other words, you can immediately make decisions to change the software according to market conditions before the software is actually finished. As a result, your software development will be more flexible and efficient. Plus, your software will be up-to-date because it always adapts to market conditions in each iteration.

- **Android Tv Based or Android Set top Box**

Android TV is a version of the Android operating system designed for digital media players, set-top boxes, soundbars, and TVs. It provides a user interface for interacting with content on a larger screen. Android TV allows users to access various apps, games, and streaming services, and it also supports features such as voice search and Google Cast. Developers can build apps for Android TV (Fadli et al., 2020a) using the Android TV platform, which provides the necessary tools and resources for creating engaging and immersive experiences for TV viewers. The platform supports the development of TV-specific apps that can be easily navigated and viewed from a distance, making it suitable for the TV environment.

2.4.1 Critical of similar product systems

- **Masjid Box**



Mosque Boxes are products that are sold massively and already have their own customers. Here, box Mosque offers products in the form of prayer time reminders and has various other additional features such as hadith, short verses, sunnah of the Prophet Muhammad SAW, and we can also add images to the menu or screen (Ichsan et al., 2021). The important thing is that with these many features, we as users are also obliged to buy the device made at a certain price, and this tool also requires a subscription at a cost of 149 ringgit per month and we can also choose not to subscribe. However, we as users only get basic features such as prayer times, reminders of the call to prayer and hadith and sunnah of the Prophet but they are limited per day. And if we also pay a subscription fee, we can only customize it to a limited extent and can't add the features we want. That way, we as buyers of this product cannot customize it according to our wishes, and we can only get this customization feature once. This time when we will make the first purchase, before buying we will be advised to consult with their team about the layout. The information that will be displayed remains with the conditions set by the

• MSU Masjid Existing Digital Signage

The existing information boards can be categorized as digital information boards because they already contain things in the form of information, such as information on prayer schedules, actual hours, hadith traditions, and information related to mosque activities, but this product has several shortcomings, such as:

- The transition on the slide is not smooth.
- Overlapping designs
- Incorrect distribution layout
- Limited information because it is in the form of images
- There is no current date.
- Only display images.



The point above is very crucial because the information board looks like it was made without standards and without thinking about the external appearance or Interface. existing, because this information board can be used as an official information media for mosques and ICC MSU to inform about activities, for example, media reporting donations, zakat for mosques, and ICC MSU.

- **Led Based Information Board**

This led based information board can be an information board but the application is still very limited because it can only provide information about prayer times and dates without any other additional information such as hadith and others, on this led based information board also has the same design and layout on almost every product, it only differs in the background, and makes this digital information board less attractive to look at because the purpose of its development is only to provide information about prayer times and dates without anything else, besides that this led based information board has a low price compared to the mosque box, and makes this digital information board less attractive to look at because the purpose of its development is only to display information about prayer times and dates without anything else (Okon & Biard, 2015) Besides that this led based information board has a low price compared to the mosque box because it does not have sophisticated features, and this led based digital information board is easy to use and simpler than the mosque box.

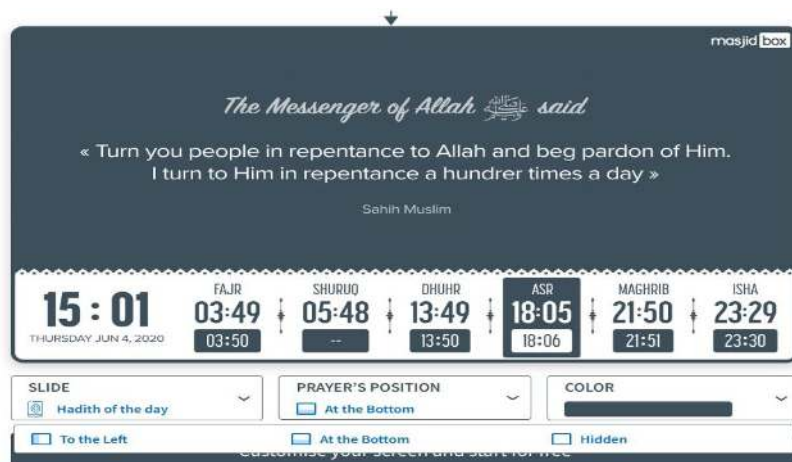
2.4.2 Review of similar products of systems

Currently, the MSU mosque has implemented the use of digital information boards to provide information to the worshiper regarding information and prayer times, but there are several limitations, including the use of additional hardware and making this product difficult to modify according to existing needs, so this additional product can only be displays prayer schedules and times in real time and several images, so there are many limitations to this product, plus the product



used has a subscription system and if we don't pay the subscription fee, this product will be disconnected or can no longer be used because we as owners have not paid the fee. It's difficult, and if this happens it can cause the equipment we bought to be unusable and we as a worshiper can't see the prayer times and the current time. It is hoped that from this research Risks such as subscription costs, products that cannot be used, and technical problems such as damaged hardware can be reduced so that it can be made easier in terms of maintenance and use of equipment so that it can save money from an economic and economic perspective. MSU Mosque can overcome or reduce these risks and create products that are friendlier or easier to modify to suit the needs of the mosque and make the work of the mosque staff easier.

- **Masjid BOX**



2GB MEMORY 32GB STORAGE HD 1080P ETHERNET WIFI BLUETOOTH



A box mosque is a set of tools, software and hardware that functions as a digital information board related to worship such as prayer times, current time, hadith and video players, in one container called a box mosque. This device has been designed in such a way that the product displayed is very good and epic, but this product has limitations, among others. Customization is limited to this device, we as users can only modify the appearance of this product once before purchasing and the modifications made are very limited, this system still uses hardware so if a problem occurs, an expert/technician from the manufacturer of this product must come and do it. check the product, and this product uses a subscription system so that if we don't pay a subscription we can only use the basic features of the product and the users are limited so we only get a product with minimal features. and less effective use and if there is damage to the equipment we must contact the product provider so that this product cannot be used for a certain period of time so that it can reduce the information that can be provided by the mosque.

Comparison	Existing Product	New Product
Cost	Pay and subscription (We pay for the product and service each month.)	Free (We built our own product)
Design	User Friendly and Neat (easy to understand and organized)	User Friendly and Neat (easy to understand and organized)
Feature	Customizable but limited (The setting in the prefix is a permanent one.)	Customizable as needed (can be customized as needed)
Information	Clear and varied (this is only applicable to information pertaining to religion.)	Clear and varied (Can add various information such as picture, and video)



- MSU Masjid Existing Digital Signage Board



- MSU Masjid Existing Digital Signage Board



These three images are digital information boards that the MSU mosque currently use. This information board already has adequate information. This information board also contains various information regarding information on activities held by the MSU mosque and also plays a big role as a reminder of prayer times, and a schedule of prayer times and there is also a time for calculating Iqomah and also



as a forum for providing information to the worshiper who are going to pray or give alarm, and there are also pictures or slides containing hadith as a reminder of sins, and there is also a time or clock, and also a digital information screen. It is connected to 4 other monitor screens so that all MSU mosque worshiper can see existing information and also the available information is quite easy for the worshiper to understand, so the information screen owned by the MSU mosque deserves to be categorized as a digital information board, because it already contains information needed by the MSU mosque ICC.

Comparison	Existing Product	New Product
Cost	Free	Free
Desing	Overlapping Desing (layout Distribution)	User Friendly and Neat ((easy to understand and organized))
Feature	Customizable but limited (The setting in the prefix is a permanent one.)	Customizable as needed (can be customize as needed)
Information	Limited and Unclear (this is only applicable to information pertaining to religion.)	Clear and varied (Can add various information such as picture, and video)



- **Led based information Board**

On the led mosque information board, this information referencing board is a referencing board that only uses LEDs as a base for information notification, this board is usually used only to indicate prayer times only, due to limited features but also this board has an affordable price, so many mosques use this LED information board to provide prayer time information, and also for this information board it is also easy to operate so that it is easy to use, many mosques use LED information boards like this because it is cheap and does not need too much operational costs.

Comparison	Existing Product	New Product
Cost	Cheap	Free
Desing	No Desing layout (no setting in the prefix is a permanent one.)	User Friendly and Neat (easy to understand and organized)
Feature	Fixed	Customizable as



	(only shalat schedule can be showed.)	needed (can be customize as needed)
Information	Limited and Unclear (only shalat schedule can be showed.)	Clear and varied (Can add various information

2.5 Summary

This research aims to create a digital information board in the mosque, this digital information board functions as an information board that can provide information to the mosque worshiper, this digital information board contains information in the mosque such as prayer time schedules, activities carried out in the mosque, important announcements such as zakat or infaq reports to the worshiper and as an official communication tool for the mosque, in this study, researchers used the web as a basis for creating an information system, because using the web can reduce costs, due to the absence of hardware, Apart from that, the use of the web as a basis for this information system can also be customized easily without the need to rely on additional tools or materials and can be done remotely so that users are more flexible and can be done anywhere without having to wait for technicians from the manufacturer of the goods. By using this web-based system, we can also create a more interactive and interesting website as a communication medium so that the distribution of information becomes more precise to the worshiper and also with this web-based system, the use of hardware, such as set top boxes, can be reduced and made more minimalist, researchers also hope that by creating this web-based information system, users will no longer need to pay very expensive costs to purchase tools like this and making the mosque more modern and communication between the mosque, the congregation and the community in the mosque better because of this information board so that the information conveyed by the mosque becomes more precise and on target and



makes the mosque more modern and communication between the mosque and all Mosque activities have become more organized and schedule.

