DESIGN AND IMPLEMENTATION OF COMMUNITY DASHBOARD ANALYTICS FOR ABIDIN MOSQUE PARISH IN KEDAH, MALAYSIA

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ARTICLE INFO	*ABSTRACT*
Keywords: *Dashboard analytics,* *UX interface,* *community empowerment*	*Data visualization is crucial since not everyone understands what is being displayed in raw data. A dashboard with data visualization is important for letting people to understanding what is occurring with the data and what the data indicates. This study attempts to identify and understand the requirements needed by the stakeholders to develop a meaningful analytical dashboard for community monitoring initiatives through the development of dashboard analytics for Abidin Mosque's parish in Kedah, Malaysia. The dashboard design was completed in the third stage using BASIC UIX. The development of the analytical dashboard implemented the UX design process and was developed by using the Data Studio platform. The findings suggest the potential to utilize the dashboard as a cheap, easy-to-use, dynamic, and interactive tool for the community monitoring system. Development of the analytical dashboard is to assist the stakeholders in reducing the amount of time it takes to prepare the reports for acknowledgment by top management and also to facilitate the decision-making process. This dashboard will assist stakeholders in making faster decisions and accomplishing their objectives.*

1. INTRODUCTION

In the rapidly evolving cyberage, where systems interconnect with growing complexity, the need for efficient data handling becomes paramount. Information visualization, as highlighted by Mifsud (2019), is indispensable in cleaning and presenting data, ensuring that users comprehend its intricacies. However, the urgency of incorporating this visualization aspect, especially in the context of the evolving cyber landscape, should be explicitly addressed in the background to underscore its contemporary relevance.

Highlighting the urgency of data visualization becomes pivotal given the challenges associated with comprehending raw data, as emphasized by the reviewer. Notably, scholars like Sarikaya, Benyon, and Matheus (2018; 2019; 2020) stress the significance of dashboards in enabling users to interpret complex data, make informed decisions, and formulate strategic plans. This importance, rooted in the necessity of empowering individuals and stakeholders to navigate the burgeoning complexities of data, should be articulated in the background to enhance the study's contextual relevance.

Choudhury (2013) sheds light on the human preference for control, a fundamental aspect rooted in evolutionary theory. Integrating this insight into the background would strengthen the argument for the urgency of information visualization. Emphasizing how dashboards provide users with control over overwhelming data, especially considering the limitations of short-term memory, accentuates the practical importance of the study in the contemporary context.

In conclusion, addressing the challenge of information overload on dashboards involves strategic solutions. Employing visual aids like charts and graphs, offering overview screens with drill-down options, and organizing data into tabs all contribute to easing the strain on short-term memory. By breaking down information into manageable chunks, our approach not only reduces cognitive load but also enhances user evaluation. This comprehensive strategy ensures that users can efficiently navigate and comprehend complex data scenarios, underscoring the practical significance of our findings

1.1 Customizing User Preferences

User Experience (UX) is the general practice of focusing on creating a good and satisfying experience for users of products and designs. Different practitioners and companies may have different definitions and perspectives on UX. UX is defined by ISO 9241-210 as a person's perceptions and responses as a result of using or anticipating using a product, system, or service. According to the definition, UX includes 'the users' emotions, beliefs, preferences, perceptions, physical and psychological responses, behaviors and accomplishments that occur before, during and after usage. UX is essential since it may improve customer satisfaction and assist in understanding the audience (Will, 2020).

Klipfolio (2020) showed that analytical dashboards are intended to assist an organization in establishing goals based on insights into historical data. Analytical dashboards solve problems by presenting trends or deeper insights based on business reporting needs (Kumar & Belwal, 2017; Zheng, 2017; Girsang et al., 2018). Business analysts, data analysts, and executives are among the users. Performance problems and weekly performance serve as the foundation for development. The analytical framework's objective is to achieve analytics goals such as insight into critical operations. While the condition of the data infrastructure of analytical dashboards is a data warehouse and database, it is based on technical reporting requirements. It requires high data latency and accurate data from various data sources integrated into a single dashboard or set of visualizations.

1.2 Dashboard Analytics

Exploring the field of information visualization and data presentation reveals valuable insights from key studies. Edward Tufte, through works like "The Visual Display of Quantitative Information" (1983) and "Beautiful Evidence" (2006), establishes the groundwork for effectively communicating intricate data visually. Tufte delves into the principles of analytical design, stressing the importance of clarity and evidence integration. In addition, Ware (2012) in his work, navigates the psychology of visual perception, offering guidance on designing visualizations that resonate with how humans naturally absorb information. Additionally, Scott Murray (2017) takes us into the lively realm of web-based interactive visualizations, providing practical insights for creating engaging user experiences.

Dashboards might be utilized as a tool to change the business culture. Managers may use a single screen to evaluate and monitor key risk indicators or key performance indicators, make decisions, and take actions to minimize the risks and improve company performance. Managers can make decisions on the market position, potential customers, and the performance of the most efficient suppliers and collaborators, among other things (Ioana et al., 2014).

According to Soni (2019), an analytical dashboard is loaded with trends and analysis. The data is utilized to understand the present approach and to identify what changes should be made in the future. To show the data, the appropriate visualization for the right data should be utilized. Without any pie charts or line graphs, there is something that appears to be a dashboard but is not. Users will be able to accurately comprehend the data with suitable visualization. It is divided into four categories: comparison (bar graphs, column charts, line graphs, etc.); composition (pie or donut charts, heat maps, treemaps, and sunburst charts); distribution (scatter charts, histogram charts, and bell curves); relationships (scatter charts, bubble charts, and network diagrams). Furthermore, the inverted pyramid rule should be followed to place the elements in such a way that the most important information is shown first. Whatever the user needs to know should be at the top of the page, and anything else that is pleasant to know maybe moved down. Figure 1 shows an example of the inverted pyramid rule in an analytical dashboard (Soni, 2019).
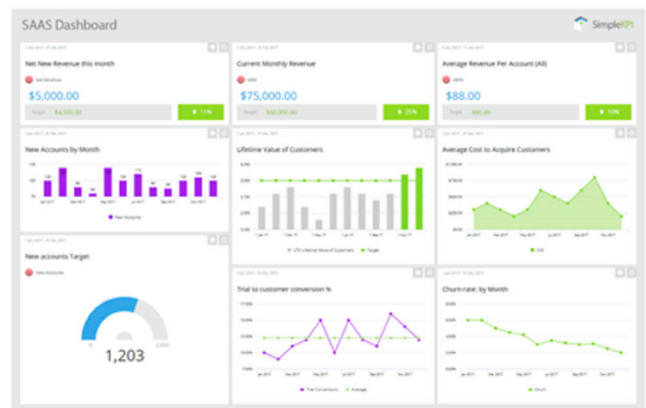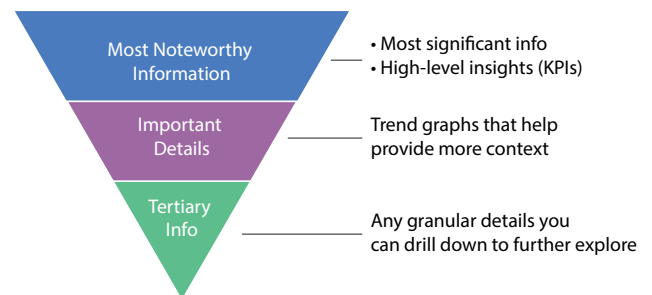

Figure 1: Example of Inverted Pyramid Rule in an Analytical Dashboard

Source: Soni (2019)

Based on Soni (2019), the dashboard for stakeholders can be designed using an analytical dashboard that employs the appropriate visualization. Besides, user experience is significant since it affects people both physically and mentally. When confronted with a vast number of facts, the physical human brain has limited short-term memory. Furthermore, the dashboard may satisfy humans' urge to control everything by providing them with a sense of control that they value. As a result, an analytical dashboard with a good user experience is required to assist stakeholders in monitoring and making decisions on business performance or business practice.

Since 2021, the Abidin Mosque Committee has been collecting data from the community through an online poll via Google Forms. While this method provides valuable information, it lacks the capability to efficiently analyze and visualize the data, leading to challenges in decision-making and resource allocation. The current system does

not allow for real-time insights or intuitive exploration of the data, which limits the committee's ability to fully understand the needs and preferences of the mosque's parishioners. To address these issues, this study aims to design and implement an interactive analytical dashboard that will provide dynamic visualizations and real-time feedback on community engagement. The primary objective of this research is to conduct a user experience (UX) study to identify the specific requirements of the Abidin Mosque community and design a dashboard that will help optimize the decision-making process, improve community engagement, and better allocate resources based on actionable data.

2. METHODOLOGY

This research is exploratory. The type of data used is primary data from the community in Abidin Mosque, Changlun, Kedah. The data will be collected through the dissemination of google form entailing information about the community's demography and sentiments to their surrounding area.

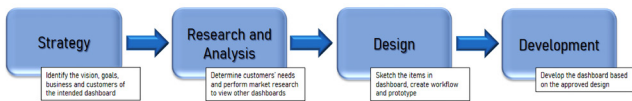The development of the analytical dashboard implemented the UX design process as depicted in Figure 2.

Figure 2: The methodology for developing an analytics dashboard based on UX design.

Based on Figure 2, first plan the strategy for designing the dashboard by recognizing the vision and goal of the business, the agenda for having the dashboard, and the target customer who will use the dashboard. Next, research was performed to identify the users' needs on the dashboard. A simple interview survey has been conducted by referring to two websites which are "*30+ user research questions for dashboard design*" (Nguyen, 2019) and "*Creating a New Dashboard for Your Reports? Ask These 26 Questions First*" (Plaut, 2016). Some suitable questions have been selected and modified for the interview survey to get the preferences of users to the analytical dashboard.

The dashboard design was completed in the third stage using BASIC UIX. Each letter in the word BASIC represents a UX principle: B is for Beauty, A stands for Accessibility, S for Simplicity, I for Intuitiveness, and C for Consistency. The word beauty is demonstrated by the dashboard's good look and feel. The word accessibility is shown by how easily the user can access the dashboard, the dashboard's simplicity assists stakeholders in making decisions, intuitiveness shows that the dashboard is easy to use and the dashboard's consistency satisfies the conditions listed above: the dashboard is beautiful, accessible, assists stakeholders in making decisions, and it is easy to use (Smith, 2016).

The dashboard was developed by using the Data Studio platform, which is a free service provided by Google. Finally, the dashboard was assessed in terms of users' experience with it. When users interact with the dashboard, this includes task performance, behavior change, and the interaction workflow.

Stage	Detail
Task Performance	The evaluation assesses the dashboard's efficiency in terms of task performance across multiple users. The time it needed to make decisions, the time it needed to complete the project, and some quality indicators were all utilized as criteria.
Behavior Change	The dashboard's ability to cause positive, long-term behavior changes in user groups is measured by behavior change. Changes in the awareness of issues related to business practice, changes in professional behavior, and working lifestyle are among the indicators utilized.
Interaction Workflow	This evaluation will look at how users interact with the dashboard in terms of information seeking, communication, and decision-making efficiency for the intended task and context.

The dashboard will use the data from Abidin Mosque's parish that consist the information regarding the community's background, including the occupation, income, marital status, residential area, and several households. A dedicated segment on the community sentiments is also constructed to capture highlighted issues in the community for further analysis. Abidin Mosque Committee collected the data through an online survey (google form) in the year 2021. Prior to the development of the dashboard, the Abidin Mosque Committee relied on traditional methods of data collection and analysis, such as online surveys using Google Forms and subsequent tabulation of data in Excel. While these methods provided valuable demographic insights (e.g., occupation, income, marital status, residential area), the process of synthesizing and interpreting this data posed significant challenges. The primary difficulty was in making the data accessible and comprehensible to stakeholders, who lacked the tools and expertise to analyze raw data and draw actionable conclusions. Existing visualizations, such as pie charts and bar charts, were static and limited in interactivity, making it difficult to explore the data in depth or customize views based on specific needs. As a result, there was a clear gap in facilitating data-driven decision-making within the community.

The need for a more sophisticated solution became apparent through interviews with key stakeholders, who emphasized the importance of creating a tool that could provide an interactive and user-friendly interface for better decision-making. They expressed a desire for a dashboard that would not only display demographic information but also allow users to interact with the data dynamically, explore trends, and make informed decisions. This highlighted the necessity of developing an analytical dashboard—one that could present the data in a more organized, intuitive, and actionable format. The dashboard's role is to streamline the decision-making process by presenting complex data in a digestible and interactive way, empowering stakeholders to engage with the community's demographic information more effectively.

3. RESULTS AND DISCUSSION

3.1 Interviews

The interview had been conducted 2 times with the end-users via virtual meeting room, WEBEX to gather all necessary information. All the stakeholders being interviewed with similar interview questions such as; "*What is the purpose of dashboard development? What do you want the dashboard to display? and What do you expect from the dashboard?*" Based on the interview, researchers found that the purpose of dashboard development is to assist in the decision-

making process. For the next question, the stakeholder wants to know more about the community's demographic background. For the third question, they expected the dashboard should be interactive, user-friendly, and easy to understand. By referring to this answer from all stakeholders, the dashboard was then developed. The process or the workflow of the dashboard development is explained in the subsection.

3.2 Sketch, Mock-up, and Workflow

The earlier stage of the dashboard's development is sketching. The sketch is crucial for determining the elements that need to be displayed on the dashboard to represent the data. The whole sketch was then converted into a proper layout called a "mockup" and it was created using Microsoft PowerPoint. The dashboard workflow shows how the dashboard process takes place.

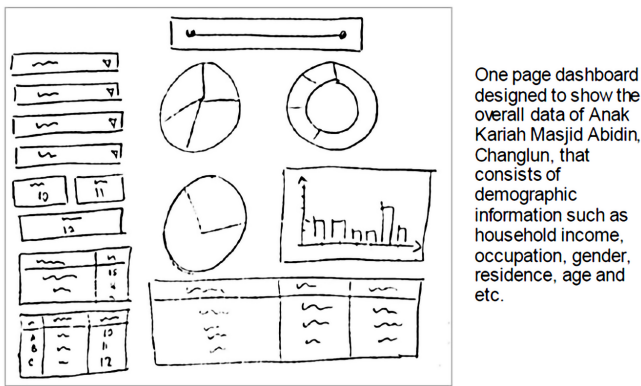The sketching of the dashboard had shown in Figure 3.

Figure 3: Sketch of Dashboard Abidin Mosque's parish

In Figure 3, there is only one page required to design the dashboard. On this page, a few elements such as pie charts, doughnut charts, bar charts, tables, and scorecards are used to represent the data. This stage will help in giving the rarf idea on how the dashboard will be presented later.

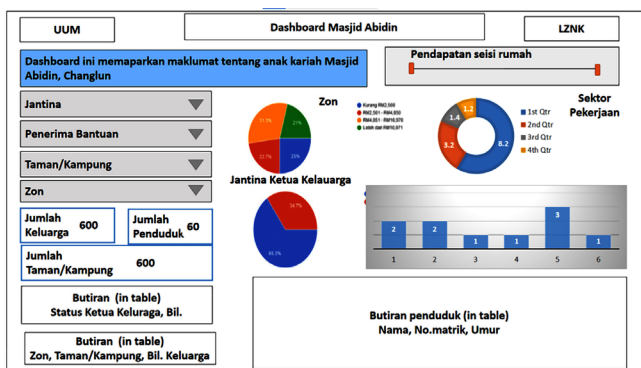The mockup of the dashboard had shown in Figure 4.

Figure 4: Mockup of Dashboard Abidin Mosque's Parish

Data visualization, such as the pie chart in Figure 4, is used to show the percentage of each demographic criteria. Meanwhile, a bar chart shows the total number of households. Three tables were used to display more detailed information about the community.

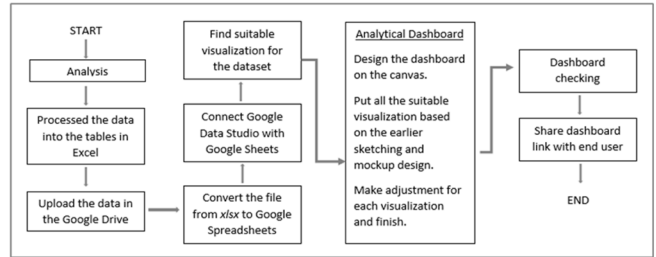The workflow of the dashboard had shown in Figure 5.

Figure 5: Workflow of Dashboard

The workflow of the dashboard has been shown in Figure 5 starts with data analysis. The data had been analyzed and then processed into tables since Google Data Studio which connects to google sheets as a data source. This Google Data Studio is a helpful and easy software which can help to develop the dashboard. First, the data that has been tabulated in Excel must be uploaded to Google Drive. If the data was in xlsx format when uploaded, convert or change it to Google Spreadsheets. Then connect the Google Data Studio with Google Spreadsheets. Next, suitable visualization should be used to display the data. The visual should also be customized and adjusted for a better look. The analytical dashboard was developed by using suitable visualization. The whole dataset was then presented on the dashboard at one glance. After completing the dashboard design, it has to be checked again to ensure the data displayed is correct and the dashboard can interact with the user. This is to make sure that the final outcome of the dashboard fulfilling the expectation of the user. Lastly, the completed dashboard can be shared with the user by copying the dashboard link and sending it to them. These process was conducted in around six months.

The final dashboard had been shown in the sub-sections and explained based on different scenarios. This is an example of a dashboard designed when we can create the dashboard. The capability here means that the data obtained from the mosque's committee is direct, where we can easily identify the data that needs to be visualized on the dashboard. Since the data given is based on the online survey, which is the respondent's answer the questions via a google form, then we can capture the data directly. The advantage here is that we can dictate how we want the data to behave naturally with the dashboard that we developed.
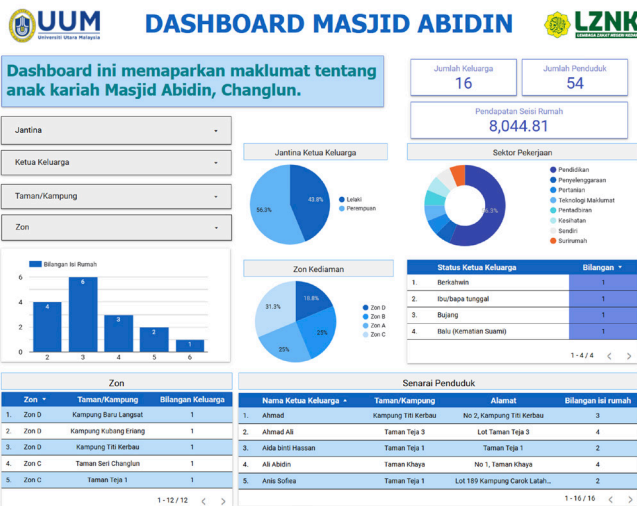
Based on Figure 6, the dashboard can show the overall data of Abidin Mosque's parish. Pie charts are used to present the percentage of zones and percentage of the gender of the parish while the bar chart is used to show the number of households involved. Besides, tables are used to show the details of the community in terms of name, residence's name, zone, the status of the head of the family, household income, and the working sector. Meanwhile, the drop-down list on the left side of the dashboard is the user's control to choose what they want the dashboard to display, and the scorecards will show the total events such as "Total of Family", "Total of Residence" and "Total of Residence Name".

Because the picture in the report is static, it cannot show the interaction of the dashboard. The relationship built in the Data Studio is helpful to find out the same category. For example, in Figure 6, by clicking "Zon A" in the pie chart, only "Zon A" is highlighted

and other zones become dark since only "Zon A" is selected. When the other zones such as "Zon C" is selected, then only "Zon C" is highlighted while other zones also are dark. The other data that relates to "Zon A" is also be displayed, while the others that are not related to it automatically hidden according to which visualization is selected. This dashboard already has the drop-down list element where it functions to control the overall event. This is one of the interactions where it allows the end-user to control the dashboard. Rather than clicking on the single data visualization displayed, such as a pie chart, doughnut chart, or bar chart, users can click on the drop-down list and choose the preferred data to view. A parish committee member of the Abidin Mosque was sent the URL to the produced dashboard so they could assess it. They are happy with the result since it makes it easier for them to compile the necessary data into a single dashboard. Their duty is completed more quickly and easily thanks to the dashboard.

Figure 6: Dashboard Abidin Mosque's parish

4. CONCLUSIONS

The analytical dashboard was designed to meet the diverse needs of stakeholders, supporting their decision-making processes and helping to achieve organizational objectives. The primary goal of the dashboard is to assist stakeholders in reducing the time required to prepare reports for top management, while facilitating quicker,

more informed decisions. Compared to traditional printed reports, which present static data and limited information, the dashboard offers a dynamic, interactive interface that allows users to drill down into the data based on individual preferences. This shift to data visualization not only makes the information more accessible and easier to understand but also makes it more engaging, ultimately improving the speed and quality of decision-making.

To assess the dashboard's effectiveness, a parish committee member of the Abidin Mosque was provided with a URL to the dashboard for evaluation. The feedback received was overwhelmingly positive. The committee member reported that the dashboard significantly streamlined their workflow, allowing them to compile the necessary data into a single, easily accessible platform. They expressed satisfaction with how the dashboard simplified their tasks, enabling them to complete their duties more quickly and efficiently than with traditional methods. This positive feedback further supports the claim that the dashboard has met the community's needs and is a valuable tool for enhancing decision-making and resource management within the mosque.

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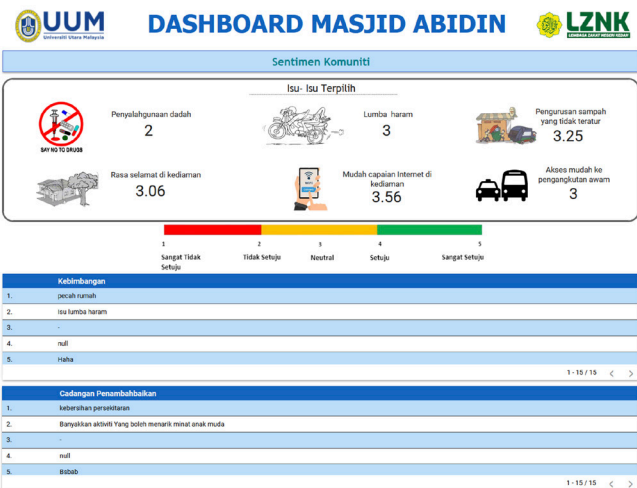
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