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Leveraging Big Data for Economic Stability: A Dashboard for ASEAN's Future Growth

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ABSTRACT

The economy is expected to decline. All countries aspire for economic stability because it can enhance a country's gross domestic product (GDP). Nations must thoroughly examine their economic realities in order to adopt strategic economic policies that foster growth and attract investment. The present dashboard only displays the inflation rate and excludes other essential economic indicators such as total economic output, current GDP rate, currency rates, and unemployment rate. The indicators were presented graphically on a separate platform without a detailed explanation, which could lead to misinterpretation. Investors may make an incorrect evaluation, leading to a financial loss. The major purpose of this project is to create a dashboard that appropriately assesses Southeast Asian states' economic stability. The primary goals of this research are to determine the techniques and requirements of an economic stability indicator dashboard for ASEAN countries, to create a console utilizing Big Data methods and to assess the usefulness of this system. This study employs the Rapid Application Development paradigm, which was chosen for its ability to efficiently build a system within a small time frame. The objectives are met successfully within the specified stages through Technology Acceptance Model. There are four dimensions were evaluated namely Perceived Ease of Use, Perceived Usefulness, Attitude and Intention to Use. The participants comprised both salaried Malaysians from various industries and self-employed people. The system's average score for all dimensions is 4.76 shows that the dashboard can help consumers make better decisions. This study is suggested to has prediction and machine learning to be used as a prediction model for future implementation.

1. INTRODUCTION

The economy is an essential component of a nation. The economy of a certain location, such as a city, state, or country, encompasses its wealth and resources. The economy will operate efficiently when there is balance between supply and demand, which represents the connection between the production and

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consumption of products and services. Supply refers to the availability of products and services, whereas demand refers to the act of purchasing these commodities and services. Economic stability refers to a state in which there is a high level of consumer spending, an increase in average incomes, low unemployment rates, and prosperous businesses (Washmuth, 2022).

Several economic indicators commonly utilized in the field of economics include the inflation rate, gross domestic product (GDP), currency exchange rates, and the unemployment rate. These indicators are crucial in assessing economic stability. Given the anticipated global economic decline due to inflation (Carlsson-Szlezak et al., 2020), it is imperative to examine the economic stability of countries worldwide. This will have a significant impact on all individuals involved in the economies of these countries, including consumers, suppliers, and investors.

1.1 Research Motivation

The current dashboard solely emphasizes the inflation rate, which is insufficient for assessing a country's economic stability. The European Central Bank's current dashboard solely concentrates on the inflation rate in the Euro region. The inflation rate of the Euro region rose by 8% from August 2022 to September 2022. The housing, electricity, and gas components have the highest HICP value of 21.1, while communication has the lowest value of -0.8 among all the components examined by HICP (European Central Bank, 2024).

The inflation rate at the end of the period is measured by the International Monetary Fund (2024a) using the consumer price index. The International Monetary Fund has created a dashboard showing the GDP growth of all countries worldwide. It includes a global map, a map timeline, and a stacked line chart. Trading Economics (2024) measures the currency exchange rate of all world currencies by exchanging them with the US Dollar. The price column displays the current price of the currency exchange, which fluctuates over time to reflect whether the currency is appreciating or depreciating, as indicated in the day column. Conversely, another graphic displays the unemployment rate of all countries on the International Monetary Fund (2024b). The dashboard contains a line chart and a geographic map with an embedded map timeline. Currently, all indicators are shown on a separate platform without a detailed explanation, leading investors to potentially make a mistaken assessment that could have financial consequences.

1.2 Problem Statement

Every nation strives for a healthy economy to enhance its national income. Countries must evaluate their economic position to develop a strategic economic plan that will enhance economic growth and attract investors. Each of The Association of Southeast Asian Nations (ASEAN) country should own an economic indicator dashboard to effectively monitor economic stability. Therefore, it is crucial for the country to own a dashboard capable of monitoring the inflation rate, GDP, currency exchange, and unemployment rate.

The existing web dashboard is inadequate for global consumers as it solely concentrates on the inflation rate. The inflation rate does not encompass all economic production or consumption (Maverick, 2022), the current GDP rate is inadequate for assessing a country's power (Fontanel, 2020), there is insufficient data on the impact of uncertainty on exchange rate fluctuations (Han et al., 2019), and there is uncertainty regarding the limited information available on the unemployment rate (Nguyen et al., 2021). Hence, it is necessary to combine these indicators as they are not robust enough on their own.

Accordingly, this study proposed an economic stability indicator provided by the European Central Bank dashboard to help users analyse the performance of the inflation rate, GDP, currency exchange and unemployment rate and the relationship between these indicators with economic stability to conclude the economic stability of the ASEAN countries. This study can help investors make decisions regarding their investments by using the projections displayed in the dashboard.

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1.3 Research Objectives

This study intends to assist ASEAN countries in visualizing the inflation rate, GDP, currency exchange, and unemployment rate of their countries and the relationship between these variables and economic stability with the aid of a dashboard. In order to reach this goal, the following objectives have been identified:

i) To determine the techniques and requirements of an economic stability indicator dashboard for ASEAN countries.

ii) To design and develop a data warehouse and economic stability indicator dashboard based on Big Data warehouse and visualization technique.

iii) To evaluate the usefulness of the economic stability indicator dashboard for ASEAN countries through the Technology Acceptance Model (TAM).

1.4 Significance

This study has utilized data visualization techniques to analyse the correlation between inflation, GDP, currency exchange, and unemployment rates in ASEAN countries, in order to assess their impact on economic stability. Inflation is a pervasive and inevitable threat for all countries worldwide. As per the findings of Carlsson-Szlezak et al. (2020), it is anticipated that this issue will worse in the coming years.

During this vital moment, consumers became aware of the significance of saving money through this study. Additionally, it aids suppliers in determining the optimal quantity of things to manufacture, preventing excessive production. Investors can gain insights on the performance of each ASEAN country, enabling them to make informed decisions regarding their investment destinations in order to maximize their potential returns.

This study is valuable for the governments of ASEAN countries, particularly for the National Recovery Council, as it aims to facilitate economic recovery in these nations. Researchers and developers can utilize this method for conducting study including creating a similar dashboard for different regions, and conducting other studies that focus on observing economic stability.

1.5 Novelty

An economic stability indicator console to assist users in analysing the performance of inflation rate, GDP, currency exchange and unemployment rate. The association between these variables and economic stability might conclude the economic stability of the ASEAN countries and may assist the investors in decision-making with the offered projections.

2. LITERATURE REVIEW

The term "big data" encompasses a vast amount of information that possesses significant potential for problem-solving (Dash et al., 2019). To improve the quality of service provided by businesses, several industries in both the public and commercial sectors utilize big data to generate, store, and analysing information. According to Kar and Dwivedi (2020), various sources of big data can be identified, including social media platforms, emails, news outlets, online forums, Internet of Things (IoT)-connected devices, telecommunications devices, sensor-based applications in gadgets, and multiple sources in multi-modal studies.

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2.1 The Role of Big Data in Business Operations

Big data is valuable in various industries, extending beyond the realm of technology. Numerous case studies have been conducted to examine the application of big data across several areas, including economics, banking, and marketing. The utilization of big data is employed to address challenges associated with the management of vast quantities of data. Therefore, numerous industries employ big data to address this issue (Dash et al., 2019). According to Kenton et al. (2022), an economy can be defined as a multifaceted system comprising interrelated manufacturing, consumption, and exchange activities, which collectively determine the allocation of resources among various stakeholders, including suppliers and consumers. An economy can be symbolized by a nation, a region, a sector, or a household. This mechanism is crucial for ensuring the efficient functioning of the economic process. To ascertain the robust stability of these ASEAN countries, they must exhibit a low inflation rate (Smith, 2019), a high GDP rate (Smith & Boyle, 2021), a low local currency exchange rate, and a low unemployment rate.

2.1.1 Economy

According to Dubey et al. (2019), the utilization of big data analytics (BDA) plays a pivotal role in generating significant insights that inform decision-making processes. There is a growing interest in integrating BDA and the circular economy (CE) in this context (Gupta et al., 2019). The concept of CE pertains to the process of closing production and consumption loops while optimizing resource utilization (Murray et al., 2017). Academic attention has been directed towards investigating the connections between BDA and decision-making effectiveness in developing market businesses, given the importance of BDA in organizations (Shamim et al., 2020). The significance of BDA capabilities in the context of the CE has garnered considerable attention from both scholars and professionals (Gupta et al., 2019).

2.1.2 Banking Sector

During the past few decades of the information science revolution, researchers with competence in data mining (DM) have shown a strong interest in implementing banking systems (Hassani et al., 2018). The proliferation of real-time financial data is rapidly growing because of the advancement and widespread adoption of e-banking and mobile banking. The banking industry has a significant responsibility in acquiring proficiency in utilizing suitable big data analytics technologies due to the continuous advancements and rapid expansion of big data accessibility.

2.1.3 Marketing

Currently, big data is widespread, encompassing both unstructured data generated by emerging communication technologies and user editing platforms, such as text, photographs, and videos, as well as structured data generated by conventional databases utilized by businesses, such as customer relationship management. The influence of social media platforms such as Facebook and Twitter on consumer decision-making is substantial, leading firms and organizations to incorporate data derived from these platforms into their marketing strategies (Amado et al., 2018). Consequently, the scope of Big Data is growing.

The utilization of Big Data-driven marketing analytics has the potential to assist organizations in addressing a range of challenges. These challenges include the identification of customers who are more inclined to positively respond to a telemarketing campaign, the development of interactive reports and dashboards for managers, and the detection of noteworthy trends derived from social media conversations about the brand. Big Data solutions can be regarded as the fundamental components of perceptive systems that effectively assist marketers, alleviating the burden of labour-intensive and human analysis.

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2.2 Economic Indicators

Kenton et al. (2022) defined an economy as an intricate network of interrelated manufacturing, consumption, and trade activities that ultimately determine the allocation of resources among many stakeholders, including suppliers and consumers. An economy can be depicted as a nation, a region, a sector, or a household. This mechanism is crucial for ensuring the seamless operation of the economic process. To ascertain the robust stability of these ASEAN countries, they must exhibit a low inflation rate (Smith, 2019), a high GDP rate (Smith & Boyle, 2021), a depreciated local currency exchange rate, and a low unemployment rate.

2.2.1 Inflation

Inflation is a key economic indicator used to assess the economic stability of a nation. Inflation, as defined by Pettinger (2021), refers to the phenomenon of prices increasing within the economy. Inflation can be more precisely defined as a sustained increase in the overall price level of an economy. Living expenses increase because of the upward movement in prices for goods and services, commonly known as inflation. The inflation rate quantifies the yearly percentage variation in the overall price level. Inflation leads to a decrease in the purchasing power of money. The statement "money will not have the same purchasing power as it did in the past" is a reference to the concept of inflation. A rise in product costs will result in a decrease in the quantity of items purchased for a given money.

In general, inflation can be classified into two categories. Firstly, cost-push inflation where occurs when a price hike is caused by an increase in manufacturing expenses, such as rising oil prices. Furthermore, the concept of demand-pull inflation. It occurs when firms increase prices due to a scarcity of commodities and a rise in general demand. Hyperinflation is typically defined as a situation where the rate of inflation surpasses 100% or 1000%. Due to hyperinflation, the rapid devaluation of money discourages its use as a means of commerce. Deflation is the term used to describe a decrease in the price level of the economy. This suggests that the inflation rate will be in the negative range.

2.2.2 Gross Domestic Product (GDP)

The gross domestic product (GDP) of a nation is a monetary measure of the products and services produced within its borders over a certain period, usually a quarter or a year (Kramer et al., 2022). GDP is the most reliable measure of an economy's well-being, as it reflects the changes in output over a specific period. While there exist many approaches to decompose the GDP, the prevailing technique involves seeing it as the aggregate of a nation's net exports, government expenditure, private consumption, and investment.

The GDP can be expressed in either nominal or real terms. Nominal GDP quantifies fluctuations in the aggregate prices and the value of the output, as it is determined by the market value of the products at the time of acquisition. Put simply, in an economy with a 5% annual inflation rate, the nominal GDP will increase by 5% each year due to the rise in prices, even if the quantity and quality of products and services provided stay the same. On the other hand, real GDP considers inflation by factoring in changes in price levels when measuring changes in actual output. Due to the lack of economic benefits from inflation-induced increases, policymakers and financial markets prioritize real GDP. The BEA uses chain indices to adjust the value of commodities and services by altering their respective costs, hence estimating real GDP.

2.2.3 Currency exchange

According to Chen et al. (2022), the currency exchange rate is defined as the rate at which one currency can be exchanged for another currency, and it has an impact on international trade and the flow of money across countries. Exchange rates are influenced by both the value of the local currency and the value of the foreign currency. The exchange rate exerts a substantial influence on international business and financial transactions within a country's economy. Moreover, it plays a pivotal role in the impact of monetary policy on the economy and assists the Reserve Bank in achieving its monetary policy objectives (Hamilton, 2018). ASEAN consists of 11 countries, each with its currency. Vecchio (2022) states that the

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Brunei and Singapore Dollar are the strongest currencies in ASEAN, as they have the lowest exchange value with the U.S. Dollar based on recent data in 2022. Conversely, the Vietnamese Dong is the weakest currency in ASEAN, with 1 USD being equal to 22,850 VND (Infomediang, 2022).

2.2.4 Unemployment

Unemployment is the state of actively searching for employment but being unable to secure a job. It is commonly known as unemployment. The unemployment rate is a widely used measure of a vital economic health indicator (Hayes et al., 2022). The unemployment rate is calculated by dividing the total labour force by the number of unemployed individuals. Many governments offer unemployment insurance to individuals who meet specific eligibility requirements.

Besides, unemployment is a vital economic indicator that reflects the capacity of people to secure profitable jobs and make a meaningful contribution to the economy's productive output. Unemployment, as defined, does not include individuals who voluntarily leave the labour force due to factors such as retirement, pursuing further education, or disability. An increase in the number of unemployed workers leads to a decrease in overall economic productivity. Cambodia had the lowest unemployment rate at 0.61%, while Brunei had the worst unemployment rate at 7.65% (The Global Economy, 2021).

2.3 Data Visualization Tools

There are several uses for data visualization tools. Presently, the most prevalent application is as a tool for reporting in the field of business intelligence (BI). Users can customize visualization tools to automatically generate dashboards that assess business performance based on key performance indicators (KPIs) and graphically analyse the results (Alghamdi & Al-Baity, 2022).

2.3.1 Data visualization

A data visualization tool is the software responsible for generating this presentation. Data visualization refers to the representation of data visually or graphically. Users can actively investigate and analyse data via data visualization, which provides them with user-friendly tools to accomplish this. This feature enables users to rapidly identify captivating patterns, deduce correlations and causations, and augment their sense-making endeavours (Vuckovic & Schmidt, 2022).

A visualization tool presents data in a comprehensible manner by analysing past data and examining future trends. The infrastructure plays a crucial role in the success of the Big Data Visualization tool. The team can get more effective insights when the infrastructure is more dynamic. The volume of data that needs to be managed, stored, and analysed is immense, and it is costly to maintain the required infrastructure (Shah, 2019). Commonly utilized data visualization technologies include Microsoft Power BI, Tableau, and Google Charts.

2.3.2 Data Warehouse

A data warehouse is a secure electronic storage system used by companies and organizations to store information. The primary objective of a data warehouse is to establish a repository of past data that can be readily accessed and analysed to provide valuable insights into an organization's operations (Frankenfield & Chavarria, 2022a). A data warehouse is an essential component of business intelligence. The larger word encompasses the information architecture that modern firms employ to monitor their past successes and failures and advise their future decisions.

A data warehouse is always subject-oriented as it focuses on providing information about a certain theme rather than the organization's real operations. It can be accomplished using a certain theme. The content is presented in a reliable structure and bears some resemblance to topic orientation. Integration refers to the process of consolidating and organizing data from many databases into a unified entity.

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Furthermore, it was necessary to store the data in several data warehouses in a manner that is both transparent and accessible. The data kept in a data warehouse is durable, as the name suggests. Furthermore, it suggests that data remains intact and unaffected even when new data is introduced (Sharma, 2018). HDFS is a widely used tool for data warehouses.

2.3.3 Data Analytics

Data analytics is the field that involves analysing raw data to make conclusions and deductions from the information. Various data analytics techniques and processes have been automated into mechanical procedures and algorithms that process raw data for human use (Frankenfield et al., 2022b). Apache Hive is an instance of data analytics tools. The four forms of data analytics are descriptive, diagnostic, predictive, and prescriptive analytics.

Frankenfield et al. (2022b) also stated that descriptive analytics is the analysis of previous data to understand what has happened within a defined period, such as calculating the total sales over the last 12 months. Diagnostic analytics is the process of determining the causes or explanations for events. This necessitates a broader range of diverse data inputs, as well as a certain level of interpretation. The objective is to identify the factors contributing to the decline in January sales compared to February sales. Predictive analytics involves analysing data to estimate future events or outcomes, such as predicting the likelihood of patient survival when specific treatments are administered. Prescriptive analytics provides recommendations or explanations for events based on predictive analytics, which focuses on comprehending the circumstance. For instance, identifying the most effective medications from a pool of pharmaceuticals that have the potential to save patients' lives.

2.4 Case Studies

Several previous research have been conducted on the relevant topics of this study, including the implemented technology, the field of economics, and the field of big data. However, it is imperative to identify the deficiencies in each relevant study to enhance the utility of this research and address the problem through the utilization of diverse methodologies derived from the current body of literature.

2.4.1 Analysis and Implementation of Data Visualization Technology

According to Meng et al. (2022), the authors highlight the significance of technological improvements in data mining and data visualization as effective means of visualizing diverse data sets. In the current era characterized by an abundance of information and data, the qualities inherent in these resources are often overshadowed by the overwhelming volume of data.

This scenario has prompted a research endeavour that uses the Extract, Transform, and Load (ETL) methodology to effectively handle the GDP data of the most prominent global economies. This study used a JavaScript-based library as the data visualization tool, capable of generating a dynamic histogram graphic that ranks historical data. The dashboard of the Analysis and Example Implementation of Data Visualization Technology is depicted in Fig. 1.

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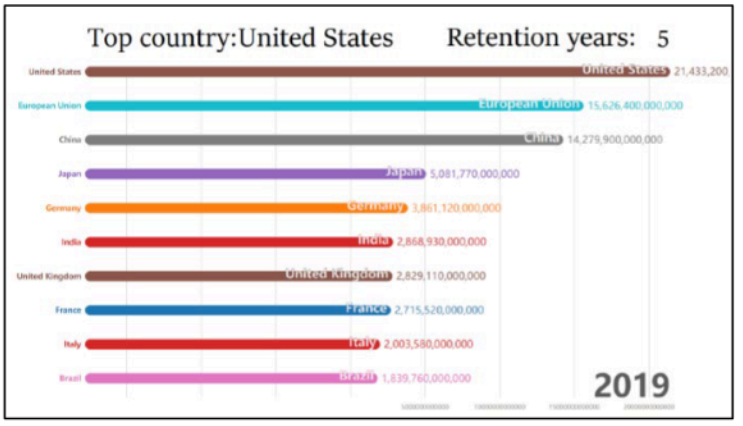

Fig. 1. Analysis and example of data visualisation technology

2.4.2 *Epidemic Data Analysis Based on Data Visualization Technology*

According to Jiao (2022), the COVID-19 pandemic that emerged at the end of 2019 had a profound effect on countries all over the world, and its rapid spread posed a serious challenge to international efforts to avoid and manage the disease.

As a result, a research of data analysis for epidemics using data visualisation technologies has been created (Fig. 2). Predictive analysis is the approach method employed in this investigation. In order to predict GDP, the linear regression method is employed. The present study employed line charts and stacked bar charts as data visualization techniques. Python is used in the creation of the charts. It was found that although the outbreak at first had a major impact on China's national economy, over time, that impact gradually decreased.

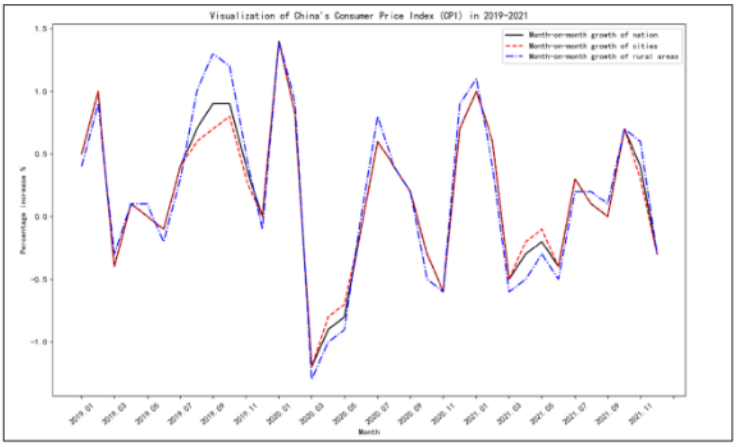

Fig. 2. Epidemic Data Analysis Based on Data Visualization Technology

Source: Jiao (2022)

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2.4.3 Relationship Between Public Health Damages and Economic Impact in the Region

An outbreak of the COVID-19 virus was detected in China in late 2019. Based on data from Worldometers, as referenced in Pozo et al. (2021), the epidemic has spread to 215 countries, affected more than 13.4 million people, and caused the deaths of over 580,230 people as of July 14, 2020. Hence, exhaustive research is necessary to ascertain the strategies that countries might employ to manage the COVID-19 epidemic, namely in the domains of economy and public health, and to anticipate their evolution in the next months.

The article by Pozo et al. (2021) presents an exploratory analysis of COVID-19 to examine the correlation between public health losses and economic consequences in the South American region. The visualization technique employed in this work is clustering analysis and principal component analysis biplot, utilizing the statistical software R. The primary metric employed in this study is the stringency index, which quantifies the extent of the restrictions imposed by each country to control the number of 28 affected individuals. The examination revealed that the stringency index exerted a detrimental influence on both GDP growth and unemployment rates, therefore precipitating an economic recession within the region.

2.4.4 Case Studies Analysis

From the relevant literature, the approaches employed include ETL, Clustering Analysis, Principal Component Analysis, and predictive analysis. Studying data visualization is an essential component of data analysis (Meng et al., 2022). To produce visual representations of the data, it is necessary to upload the data into the data warehouse prior to the data analysis process. Hence, the ETL procedure was employed to manage the data and transfer it into the data warehouse. The study undertaken by Pozo et al. (2021) using Clustering Analysis to examine the data of two distinct groups: one consisting of public health-related data and the other consisting of public health data mixed with economic-related data. Next, the Principal Component Analysis was employed to ascertain the correlation between the variables. Thus, these two analytical approaches appear to be efficient for examining and establishing the correlation between the variables.

The line chart and bar chart are the most utilized data visualization tools for constructing an economy-related dashboard display. Furthermore, the economic dashboard incorporates a pie chart, however it is less frequently utilized in comparison to the line chart and bar chart. Moreover, the scatter plot serves the purpose of illustrating the dispersion of the data or the correlation between the variables inside the dashboard.

3. METHODOLOGY

The Rapid Application Development (RAD) model has been selected as the research approach due to its appropriateness in effectively constructing a system within restricted time limitations (Ridoh et al., 2020). The selection process was conducted with consideration of its ability to effectively create the dashboard within a limited time constraint. The process consists of four separate stages (analysis, prototype development, testing, and implementation) that involve a variety of interconnected tasks, with the user taking on different responsibilities, especially during the prototype phase.

3.1 Analysis

The initial stage of the RAD model started with the establishing of the problem statement, objectives, scope, and importance of the study after its proposal. During the process of studying the definition, the necessary criteria for the dashboard were determined. Subsequently, the timeline was constructed utilizing Microsoft Excel to generate a Gantt Chart. To facilitate the initial stage, a comprehensive literature study was conducted by perusing news stories, scholarly publications, and papers on inflation, GDP, currency

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exchange, and unemployment. This review was conducted using reputable journal databases like IEEE, ScienceDirect, ACM, and Scopus. Subsequently, the baseline specifications for the dashboard were established. The initial objective is achieved after the establishment of the system requirements.

3.2 Prototype

In this stage, the iterative process of constructing, demonstrating, and refining is undertaken, involving users in different roles. The participants in this phase specifically include of the lecturers at UiTM Perlis who have expertise in the domain of information technology. The lecturers actively contributed to the refinement process by pooling their expertise and offering their insights on the creation of the dashboard.

3.2.1 Build

The wireframe of the dashboard was created during the construction process by utilizing Uizard to design the user interface design. Subsequently, the dashboard was constructed following the outlined wireframe. The procedure commenced by gathering data from Trading Economics (2024). Subsequently, the ETL process was executed, encompassing the extraction, transformation, and loading of the data. After the data has been gathered, it is then converted into a suitable format for a data warehouse. A further step involved the loading and storage of the data into the data warehouse. The data warehousing tool employed in this investigation was HDFS. The datasets contained in the Hadoop Distributed File System (HDFS) encompass the inflation rate, GDP rate, currency exchange rate, and unemployment rate. After storing the data, it will be more convenient to get the data for subsequent analysis and visualization.

3.2.2 Demonstrate

Data analytics was utilized to interrogate the archived data in the data warehouse during the demonstration phase. The technology used was Apache Hive, with the query language being HiveQL, which is a SQL-like statement. Data were systematically examined throughout this time to analyse the economic stability of ASEAN countries. Analysed data from the dataset held in the data warehouse has been used to determine the stability level of each country from 2000 to 2022. The execution of this phase was accomplished by utilizing Hive within the virtual machine known as VMWare Workstation 16. The analysis has been presented thoroughly, as follows:

Step 1: Hive connection.
Step 2: Create a database.
Step 3: Use a database.
Step 4: Create tables.
Step 5: Load data into the table.
Step 6: Describe the table.
Step 7: Display all data in the table.
Steps 8 to 17 were iterated to determine the stability level of each country from the year 2000 to 2022.
Step 8: Create an average table for inflation, GDP, and unemployment.
Step 9: Create a table of average currency.
Step 10: Create a table to combine tables.
Step 11: Export data into HDFS.
Step 12: Create a table for loading data.
Step 13: Load exported data into the table that has been created.
Step 14: Create a table to determine ranking.
Step 15: Create a table for sum points of rank1, rank2, rank3 and rank4.
Step 16: Create a table to determine economic stability status.
Step 17: Export data into HDFS.

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After obtaining the economic stability data, subsequently the data were uploaded to the local computer in the form of several csv files and was consolidated into a unified csv file using Microsoft Excel. After the completion of data analysis, the visualization process would involve the utilization of a business intelligence application known as Microsoft Power BI. In order to enhance the interactivity of the dashboard and facilitate the visualization of the economic position of ASEAN countries over time, a Pareto chart was incorporated (Fig. 3). The achievement of the second objective was realized upon the establishment of the ASEAN Countries Economic Stability Indicator Dashboard.

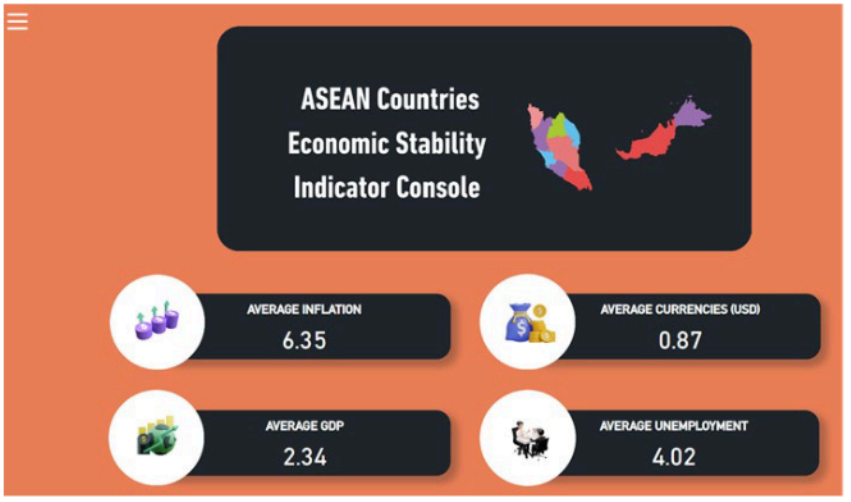

Fig. 3. Data visualization homepage

The dashboard displays four indicators, including the inflation rate, GDP, currency, and unemployment rate. The overview page, depicted in Fig. 4., presents a visual representation of the analysed data within the Hive warehouse. This webpage presents an analysis of the economic stability of ASEAN countries spanning the period from 2000 to 2022, encompassing all four specified indicators. In addition, the inflation page provides comprehensive information regarding the inflation table, encompassing data spanning from 1958 to 2023. The GDP page contains data spanning from 1975 to 2022. The currency page presents a comprehensive representation of the currency table, encompassing data spanning from 1983 to 2023. Finally, the unemployment website provides comprehensive information regarding the unemployment table spanning from 1977 to 2023. The metrics including the GDP rate, currency exchange rate, currencies, and unemployment rate on all four pages offer prognostications for the forthcoming decade in the ASEAN nations.

Subsequently, the dashboard was introduced to the user with the purpose of obtaining input for the subsequent improvement process.

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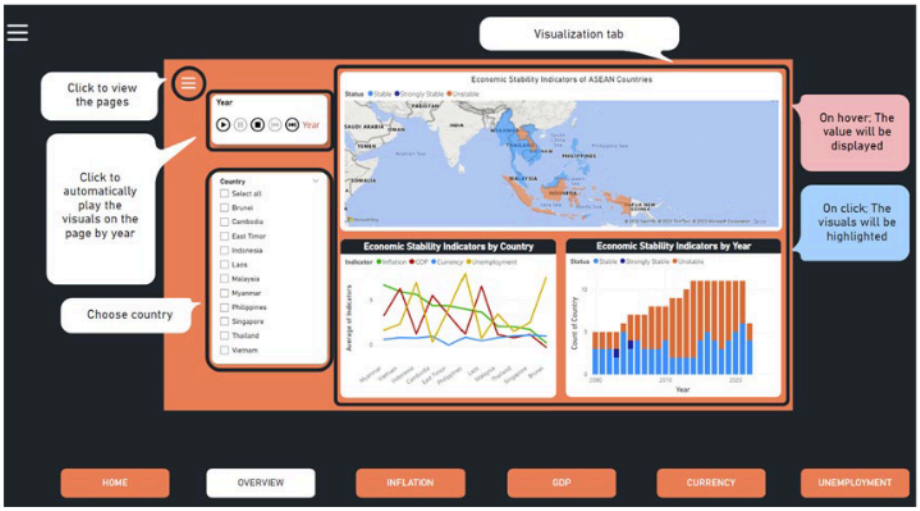

Fig. 4. Page Overview

3.2.3 Refine

If any areas requiring enhancement were identified concerning the generated dashboard, the subsequent step involved resuming the construction activity to create a wireframe for the absent components of the dashboard. The methods were iterated throughout the cycle till the emergence of the ultimate dashboard for the ASEAN Countries Economic Stability Indicator Dashboard.

3.3 Testing

Prior to deploying the final dashboard to the end user, this phase is of utmost importance. In order to conduct functional testing, the functional requirements of the dashboard were compiled and presented in a tabular format. Subsequently, the developer verified the satisfaction of all the prerequisites to ascertain whether the dashboard has met all the system needs.

3.4 Implementation

This phase encompassed two primary actions, namely evaluation and documentation. During the evaluation process, the usability of the dashboard will be assessed using the Technology Acceptance Model (TAM) technique.

The study's sample consisted of 50 individuals from Malaysia, encompassing both males and females aged between 24 and 59 years. The participants were provided with a questionnaire regarding the dashboard that was created as part of this study. The study will conclude once all 50 respondents have completed the surveys. Finally, all the specifics of the dashboard, from the first proposal to its implementation, were recorded during the documentation process. The attainment of the third objective occurs after the successful implementation of the dashboard's usability.

3.5 Summary

The methodology section of this study centers on the techniques employed in the development of the ASEAN Countries Economic Stability Indicator. The Rapid Application Development (RAD) approach was utilized in this study. The selection of this methodology was based on its capacity to efficiently complete the dashboard within a specified timeframe. This technique consists of four distinct phases, each involving a series of interconnected activities. During the prototype phase, the user plays a crucial role in

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these activities. The active participation of both the user and the developer during the prototype phase facilitates the developer's ability to enhance the dashboard based on user feedback. The further development of the dashboard is facilitated by the active input of both the user and the developer during the prototype phase. The stated objectives are effectively achieved during the several phases of RAD.

4. RESULT AND DISCUSSION

The evaluation process employs the Technology Acceptance Model (TAM). The study sample comprised 53 Malaysian individuals who were employed and were within the age range of 24 to 59 years. The assessment comprises four attributes, namely Perceived Ease of Use, Perceived Usefulness, Attitude, and Intention to Use. These attributes are assessed using a 5-point Likert scale instrument.

4.1 Perceived Ease of Use

This dimension represents the initial aspect of the TAM evaluation model. This section will primarily concentrate on evaluating the extent to which the produced system offers a user-friendly experience. The results indicate that the average score for the initial dimension is 4.74. The findings indicate that all participants expressed high agreement or agreement with the ease with which adults can study the content to acquire economic knowledge through the utilization of the ASEAN Countries Economic Stability Indicator Dashboard.

4.2 Perceived Usefulness

The second dimension of the TAM evaluation model is being referred to. This dimension pertains to the assessment of whether the system has improved the performance of the users. The results indicate that the average score for the initial dimension is 4.75. Based on the findings, it was observed that 41 participants expressed a strong agreement with the notion that the ASEAN Countries Economic Stability Indicator Dashboard will enhance their comprehension of the economy. Ten individuals agreed on this matter, while the remaining two remained neutral.

4.3 Attitude

The third dimension of the TAM evaluation model is represented by this. This dimension pertains to the user's disposition towards the system. The questionnaire results indicate that the average score for this dimension was 4.81. According to the findings, a total of 44 participants expressed a significant inclination toward endorsing the utilization of the dashboard as a tool for decision-making. Seven individuals agreed with this inquiry, while the remaining individuals remained neutral.

4.4 Intention to Use

This dimension is the final aspect of the TAM evaluation model. This dimension pertains to the assessment of the user's desire to utilize the built system. The mean score for this dimension was determined to be 4.75 based on the findings. All respondents expressed a strong agreement or agreement with the notion that they intended to utilize the dashboard as a tool for decision-making, assuming they had access to the dashboard.

4.5 Result Analysis

There are four dimensions that were evaluated which are Perceived Ease of Use (PEU), Perceived Usefulness (PU), Attitude (ATT) and Intention to Use (BI). The mean score for each dimension is depicted in Fig. 5.

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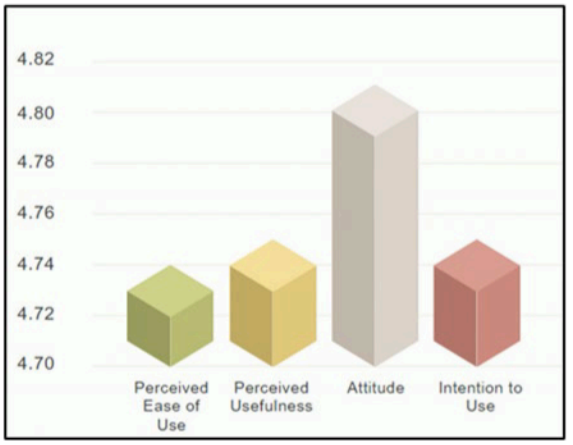

Fig. 5. Mean Score for All Dimensions using TAM

PEU is the first dimension which has 4.74 as the mean score. For this dimension, the study shows that ASEAN Countries Economic Stability Indicator Dashboard is clear, understandable and the contents are easy to be explored. The dashboard does not require a lot of mental effort for adults to use it and they are able to use independently at home and office. Regarding the PU, the average score is 4.75, suggesting that the dashboard will significantly enhance the respondents' comprehension of the present economic circumstances. Both investors and non-investors can benefit from this scenario as a tool for decision-making and as a means of attracting their interest in investing.

The dashboard's suitability as a tool for decision-making is demonstrated by the ATT mean score of 4.81. The study demonstrates the positive outlook about dashboard use. Furthermore, the dashboard's user-friendly flow and comprehensive user manual make it straightforward to use. Determining if the user intends to use the developed system is the main goal of the BI dimension. The average score of 4.75 suggests that the dashboard is one of the respondents' preferred applications for use as a tool for decision-making and that they plan to utilize it. They also concur that the public may use the dashboard, and that the government must think about using it as a resource.

The mean score for every dimension is above 4.7 which indicates that the system provides usefulness for the end user. The use of the console is beneficial for investors as it allows them to obtain valuable information about the performance of certain ASEAN countries.

During this study, consumers recognized the necessity of economizing during this challenging period. Additionally, it can aid suppliers in identifying the optimal quantity of things to manufacture to prevent excessive production. Investors can gain insight into the performance of each ASEAN country, enabling them to make informed decisions about where to invest to maximize their profits. The study provided valuable insights to the governments of ASEAN countries, particularly the National Recovery Council, to assist in the economic recovery of these nations. This technology can be utilized by academics and developers for creating a consistent dashboard for several locations and doing other investigations.

5. CONCLUSION

This study has presented a data visualization depicting the correlation between inflation, GDP, currency exchange, and unemployment rates, and their impact on economic stability among the ASEAN countries. Inflation has emerged as a worldwide and inevitable concern for all nations. Based on the findings of Carlsson-Szlezak et al. (2020), it is anticipated that this issue will be worsened in the forthcoming years.

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This study revealed that customers have come to recognize the significance of saving money during this crucial period. Investors can make well-informed judgments and optimize their prospective returns by gaining insights on the performance of each ASEAN nation. The governments of the ASEAN nations will find great benefit from this study, especially the National Recovery Council, which will use the data warehouse and dashboard of economic stability indicators to help the economies of the nation's recover. In terms of the investigators and designers, this approach can be utilized in research projects concerning the development of a uniform dashboard across various regions, and further studies that give priority to the monitoring of financial stability.

The console functions as a valuable instrument for users in facilitating the processes of decision-making. The assessment of the performance of each ASEAN country will be made available to investors, allowing them to make informed investment decisions and optimize potential profits. It has the potential to be applied in creating dashboards that can be used in multiple locations.

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5. 7. CONFLICT OF INTEREST STATEMENT

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts and declare the absence of conflicting interests with others.

6. 8. AUTHORS' CONTRIBUTIONS

Norfiza binti Ibrahim carried out the research, wrote and revised the article. **Nurul Athirah Aziz** designed and developed the visualisation dashboard. Aznoora Osman conceptualised the central research idea. **Nadia Abdul Wahab** designed the research and supervised research progress. **Azmi Abu Seman** tested all the components of the mobile application. **Siti Sarah Md Ilyas** anchored the review, and revisions of the article submission.

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