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Exploratory Data Analysis: Visualization of Average Wages of Workers in Indonesia by Region of Residence using Google Data Studio

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ABSTRACT

This study analyzes the average hourly wage of workers in Indonesia by region of residence, using data from the Central Bureau of Statistics (BPS) for the period 2018-2022. The data is divided into three categories: rural, urban, and combined urban and rural. The analysis was conducted using Exploratory Data Analysis (EDA) method and data visualization using Google Data Studio. The results of the analysis show that there is significant variation between wages in urban and rural areas. In rural areas, the highest average wage was recorded in 2020 at IDR 14,242, and the lowest in 2018 at IDR 11,557. Wages in rural areas increased from 2018 to 2020, then decreased in 2021 and 2022. In urban areas, the highest wage in 2021 reached IDR 20,234 per hour, while the lowest in 2018 was IDR 17,326 per hour. The wage trend in urban areas increased from 2018 to 2021, followed by a decline in 2022. The combined urban and rural data shows the highest wage in 2021 at 18,089 Rupiah per hour and the lowest in 2018 at 15,275 Rupiah per hour. The data visualization reveals that workers in urban areas have higher wages than workers in rural areas, with a five-year average of 28,957 Rupiah per hour in urban areas and 13,067 Rupiah per hour in rural areas. In conclusion, there is a significant disparity between wages in urban and rural areas, with a decline in wages by 2022 indicating an economic impact that requires adaptive policies.

1. Introduction

Indonesia, with a population of more than 270 million, is the world's largest archipelago consisting of more than 17,000 islands. As a culturally, linguistically and economically diverse country, Indonesia faces great challenges in managing its economic well-being. One important indicator that is often used to measure the economic well-being of a society is the average wage of workers (Bilan et al., 2020). Wages not only reflect the economic condition of individuals but can also be used as an indicator of labor market health, productivity levels, and wealth distribution in different regions (Aitken, 2019).

Along with the development of technology and globalization, data visualization has become a very important tool in economic analysis. Google Data Studio, as one of the leading data visualization tools, offers a variety of features that make it easier for users to present data in a more attractive and understandable form (Hurst, 2020; Riyanti et al., 2024). In this context, this study aims to explore the average wage data of workers in Indonesia by region of residence using Google Data Studio. The aim

is to provide a clearer picture of the wage distribution in Indonesia and identify factors that may influence the wage differences.

The wage distribution of workers in Indonesia shows significant disparities between urban and rural areas, as well as between provinces. This disparity has led to various social and economic problems, including poverty, inequality of opportunity, and uncontrolled urbanization (Watif et al., 2024). In addition, the lack of access to education, job training, and adequate infrastructure in remote areas further exacerbates these disparities. This is often due to the lack of accurate and up-to-date data on economic conditions in different regions. Therefore, a comprehensive and data-driven approach is needed to understand these conditions and develop policies that can reduce economic inequality in Indonesia.

Various studies have been conducted to examine the wage distribution of workers in Indonesia. Wage inequality in Indonesia is an urgent issue to address as it has a direct impact on people's welfare and social stability (Chairani, 2024; Hasyim et al., 2023; Jabid et al., 2023). High inequality can lead to increased poverty levels, social discontent, and political instability. In addition, wage inequality can also hamper overall economic growth as regions with low wages may not be able to attract investment and experience economic stagnation. In the context of sustainable development, reducing wage inequality is also important to achieve various development goals, such as poverty alleviation, quality education, and decent work. Therefore, understanding the factors that affect wage distribution and developing strategies to reduce these inequalities is crucial (Fahri, 2022; Sudarmo et al., 2022; Suryaningrum et al., 2023).

Google Data Studio, as a powerful data visualization tool, can help in analyzing and presenting wage data in a more informative and easy-to-understand manner (Azis et al., 2022; Kraugusteeliana & Violin, 2024). By utilizing this tool, policymakers, researchers, and the general public can obtain data visualizations regarding wage conditions in Indonesia and can analyze trends from the characteristics of the data.

The main objective of this research is to conduct an exploratory analysis of the average wage data of workers in Indonesia based on the region of residence using Google Data Studio. The specific objectives of this research include Data will be collected from various reliable sources such as the Central Bureau of Statistics (BPS), Ministry of Manpower, and other economic reports. This data will then be processed to ensure consistency and accuracy. This tool will be used to create an interactive visualization that makes it easier to understand the distribution of wages in different regions. This visualization is expected to help in identifying patterns and trends that may not be visible in conventional data analysis. This research will compare average wages across different regions to identify any disparities or inequalities. This analysis will include comparisons between urban and rural areas, as well as between provinces.

2. Literature Review

To visualize the average wages of workers in Indonesia according to their residential areas, the data for this analysis can be sourced from various studies that focus on income, economics, and regional factors in Indonesia. One relevant study by (Ramli et al., 2022; Wiadnyana & Hadiyati, 2023) investigates the impact of economic growth, minimum wage, education, and unemployment on poverty in Bali. This study employs quantitative research methods and examines how these variables influence poverty rates, which can provide insights into income levels in different regions of Indonesia. In examining the average wages of workers in Indonesia by region of residence, it is crucial to consider various factors that impact wages across different regions. Research by (Maghfirah & Samosir, 2022) underscores the significance of conducting spatial analysis to comprehend the average wage disparities between regions in Indonesia and the determinants contributing to these differences. This spatial approach enables a thorough examination of wage distribution patterns and the factors influencing them. Furthermore, the study by (Krisnandita, 2023) illuminates the determinants of migration flows among highly skilled individuals in Indonesia, where average wages for workers play a significant role. This suggests that wage levels can impact migration patterns, potentially influencing the distribution of skilled labor across different regions. Additionally, (Sudaryo et al., 2023) discuss the correlation between regional minimum wage increases and infrastructure spending in Indonesia. The findings suggest that higher regional minimum wages can lead to enhanced welfare and increased regional spending, including investments in infrastructure. This implies a potential connection between wage levels, economic development, and public expenditure priorities across regions.

By integrating data from these studies and potentially others that focus on income, regional disparities, and economic factors in Indonesia, a comprehensive analysis can be conducted to visualize the average wages of workers across different residential areas (Urva et al., 2023). Considering these insights, when visualizing the average wages of workers in Indonesia by region of residence using Google Data Studio, it is vital to integrate spatial analysis, minimum wage disparities, migration patterns of skilled workers, and the impact of wage levels on regional development and infrastructure spending. By incorporating these factors into the visualization, a more comprehensive understanding of wage disparities and their implications for different regions in Indonesia can be achieved.

3. Research Methods

The research method used in this study is an Exploratory Data Analysis (EDA) approach to analyze and visualize the average wage of workers in Indonesia based on region of residence. EDA is an approach in data analysis that aims to find patterns, trends, and relationships in data through data visualization (Ibrahim et al., 2023; Sudipa et al., 2023). In the context of this study, EDA will be used to understand the distribution of workers' wages, identify disparities between regions, and explore the factors affecting wage differences by region of residence in Provinces in Indonesia, with parameters of Rural Area, Urban Area and Rural Area + Urban Area. The main tool used in data visualization is Google Data Studio. The research's stages are depicted in Figure 1 below:

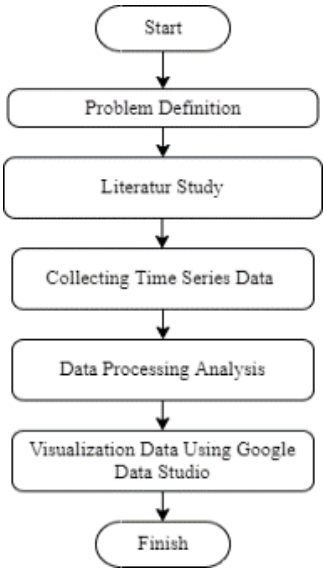

Figure 1. Research Stages

An explanation of Figure 1 can be provided. The use of time series data visualization in literature analysis can provide insight into data trends and patterns (Dewantara & Giovanni, 2023; Efitra et al., 2024; Suryadana & Sarasvananda, 2024). The problem discussed relates to the absence of a visual representation of the average wages of workers in several provinces in Indonesia, in terms of Rural Areas, Urban Areas and Rural + Urban Areas. The data used is sourced from the official website of the Central Statistics Agency (BPS) for 2018-2022. The methodology used in this study categorizes the data on the difference in the average wages of workers in provinces in Indonesia in terms of Rural Areas, Urban Areas and Rural + Urban Areas, using the Microsoft Excel spreadsheet extension, considering hourly wages by month and year of arrival. The concluding stage involved the use of Google Data Studio charts to visually represent the data on the average wages of workers in different provinces in Indonesia in terms of Rural Areas, Urban Areas and Rural + Urban Areas.

4. Results and Discussions

Data Analysis

This data on the average hourly wage of workers by region of residence (Rupiah/hour) for 2018-2022 is taken from the Central Statistics Agency (BPS). This data contains the amount of workers' wages per hour based on the area of residence which is divided into three, namely, urban, rural, and urban + rural. The data used is data for 2018-2022. Furthermore, this data is visualized into several diagram displays, which can be seen in the figure below.

Table 1. Data on average hourly wages of workers by region of residence (IDR/hour), 2018-2022.

Region of Residence	**Average Wage (IDR/hour)**				
	2018	**2019**	**2020**	**2021**	**2022**
Rural	17.326	17.825	14.242	14.182	13.151
Urban	11.557	12.205	19.651	20.234	19.751
Urban + Rural	15.275	15.823	17.696	18.089	17.542

Data Visualization

The process of visualizing data demographic trends using google data studio tools. The research data uses data on the average wage of workers per hour (Rupiah / hour) based on three categories, namely Rural Areas, Urban Areas and Rural + Urban Areas, 2018-2022, taken from the Central Statistics Agency (BPS). This data contains the amount of workers' wages per hour based on provinces in Indonesia.

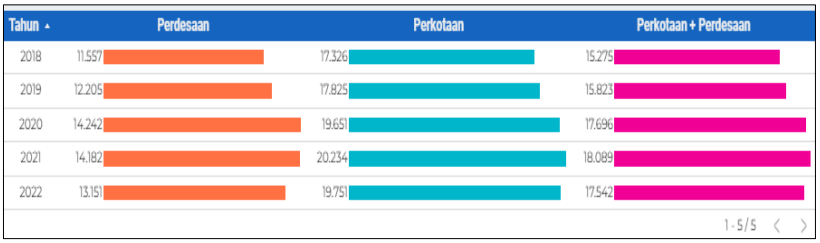

Fig 1. Data Visualization of Residence Data Categories

The figure above is a visualization of the average wage of workers by region of residence in 2018 - 2022 which is divided into three categories, namely the average wage of workers residing in rural, urban, and rural + urban areas. The data visualization displayed is a table diagram with rows. From the results of the data visualization above, it can be seen that:

a) Rural
   Based on the rural category, the highest average wage per worker hour was in 2020 with an average wage value of 14.24. While the lowest average wage per worker hour was in 2018 amounting to 11,557.
b) Urban
   Based on the urban category, the highest average wage per worker hour is in 2021 with an average wage value of 20,234. Meanwhile, the lowest average wage per worker hour was in 2018 at 17,326.
c) Urban + Rural
   Based on the urban + rural category, the highest average wage per worker hour was in 2021 with an average wage value of 18,089. Meanwhile, the lowest average wage per worker hour was in 2018 at 15,275.

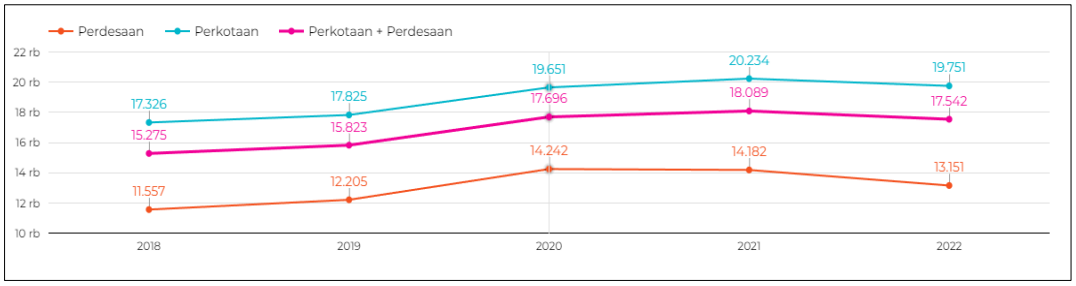

Fig 2. Line Diagram of Average Hourly Wage Data of Workers for 5 Years

The figure above is a visualization with a line diagram of the average hourly wage data for 5 years. From this visualization, it can be seen that the highest wage of workers is in 2021 with the urban category where the wage of workers is 20,234 thousand. While the lowest wage is in 2018 with the rural category where the worker's wage is 11,557 thousand. From the visualization, it can also be seen that there is an increase and decrease in workers' wages, namely:

a) Rural
Based on the diagram in the rural category for 5 years, there was an increase in the average wage of workers in 2018-2020, then a decrease in 2021-2022. In 2019 there was an increase in the average wage of workers by 5.61%, which was originally in 2018 of 11,557 to 12,205 in 2019. In 2020 there was an increase in wages of 16.69% from 12,205 in 2019 to 14,242 in 2020. In 2021 there was a decrease in wages of 0.42% from 14,242 in 2020 to 14,182 in 2021. In 2022 there was a decrease in wages of 7.27% from 14,182 in 2021 to 13,151 in 2022.

b) Urban
Based on the diagram in the urban category for 5 years there was an increase in 2018-2020, then a decrease in 2021-2022. In 2019 there was an increase in the average wage of workers by 2.88% which was originally in 2018 of 17,326 to 17,825 in 2019. In 2020 there was an increase in wages of 10.24% from 17,825 in 2019 to 19,651 in 2020. In 2021 there was an increase in wages of 2.97% from 19,651 in 2020 to 20,234 in 2021. In 2022 there was a decrease in wages of 2.39% from 20,234 in 2021 to 19,751 in 2022.

c) Rural + Urban
Based on the diagram in the rural + urban category for 5 years there was an increase in 2018-2020, then a decrease in 2021 and 2022. In 2019 there was an increase in the average wage of workers by 3.59%, from 15,275 in 2018 to 15,823 in 2019. In 2020 there was an increase in wages of 19.48% from 15,823 in 2019 to 17,696 in 2020. In 2021 there was an increase in wages of 2.22% from 17,696 in 2020 to 18,089 in 2021. In 2022 there was a decrease in wages of 3.02% from 18,089 in 2021 to 17,542 in 2022.

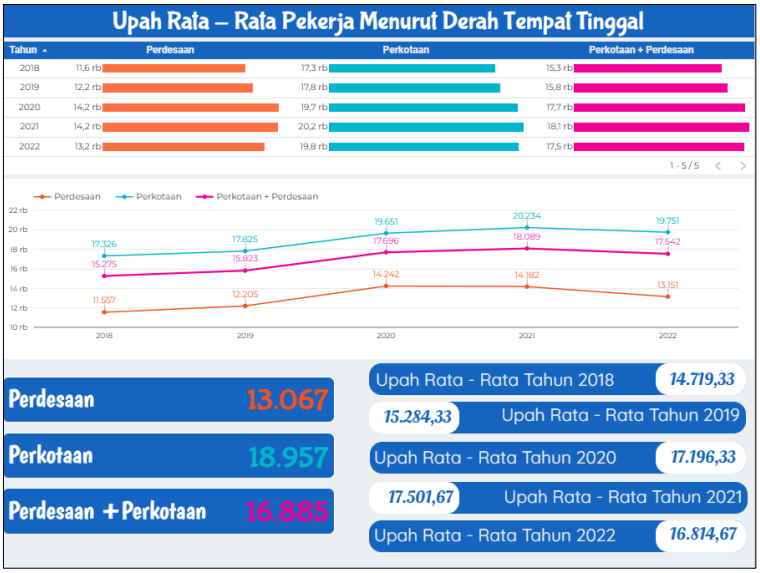

Fig 3. Visualization of Average Wage of Workers by Region of Residence

The figure above is a visualization with a scorecard of the average hourly wage data for 5 years based on 3 existing categories. From the visualization above, it can be seen that the average wage of workers residing in urban areas is the highest average wage value compared to the average wage of workers residing in rural areas. Where the average wage of workers in urban areas is 28,957 for 5 years. While the average wage of workers who live in rural areas is 13,067 for 5 years. From the visualization above, it can be seen that the average wage from 2018-2021 has increased, while the average wage of workers has decreased in 2022. In 2019 the average wage of workers increased by 3.84%, with the previous average wage of 14,719.33 in 2018 to 15,284.33 in 2019. In 2020 the average wage of workers increased by 12.51%, with the previous average wage of 15,284.33 in 2019 to 17,196.33 in 2020. In 2021 the average wage of workers increased by 1.78%, with the previous average wage of 17,196.33 in 2020 to 17,501.67 in 2021. In 2022 the average wage of workers decreased by 3.93%, with the previous average wage of 17,501.67 in 2021 to 16,814.67 in 2022.

5. Conclusion

The conclusion of the study shows that analysis of data on average hourly wages of workers by region of residence in Indonesia over the period 2018-2022 reveals significant variation between urban and rural areas. Data from the Central Bureau of Statistics (BPS) shows that in rural areas, the highest average wage in 2020 was 14,242 Rupiah, and the lowest in 2018 was 11,557 Rupiah. Wages in rural areas increased from 2018 to 2020, then decreased in 2021 and 2022, with a significant decrease of 7.27% in 2022. In urban areas, the highest wage in 2021 reached IDR 20,234 per hour, while the lowest in 2018 was IDR 17,326 per hour. The wage trend in urban areas shows an increase from 2018 to 2021, followed by a decrease of 2.39% in 2022. The combined urban and rural data shows the highest wage in 2021 at IDR 18,089 per hour and the lowest in 2018 at IDR 15,275 per hour. The trend also reflects an increase until 2021, followed by a decrease of 3.02% in 2022. Visualization of the data using Google Data Studio makes clear the differences in the average wages of workers in different regions. The graph shows that workers in urban areas have higher wages than workers in rural areas, with a five-year average of 28,957 Rupiah per hour in urban areas and 13,067 Rupiah per hour in rural areas. The results of data analysis and visualization show that there is a significant disparity between wages in urban and rural areas. Policies that focus on improving education, skills training, and infrastructure investment in rural areas are needed to reduce this disparity. The wage decline in 2022 indicates an economic impact that needs to be addressed with adaptive policies.

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