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Europe Average Monthly Earnings Report - Documentation

# Introduction

The Europe Average Monthly Earnings Report is a comprehensive reporting solution designed to analyze and visualize mean monthly earnings data across various demographics, occupations, and industries within Europe. This documentation provides an overview of the project, its purpose, and how users can navigate through the report.

# Links

**GitHub:**

[https://github.com/kon-mat/DataAnalysis/tree/aa0720428218926acdac86d7b1ccb85ab3775cec/PowerBI/Projects/Average Monthly Earnings EU](https://github.com/kon-mat/DataAnalysis/tree/aa0720428218926acdac86d7b1ccb85ab3775cec/PowerBI/Projects/Average%20Monthly%20Earnings%20EU)

**Dataset:**

<https://data.europa.eu/data/datasets/f26eoqiquywllgwsjtdqlq?locale=en>

# Tools Used

**Database:** Microsoft SQL Server

**BI Tool:** Power BI

# Business Problem

The Europe Average Monthly Earnings Report addresses several key challenges faced by stakeholders:

* Understanding Income Disparities:
  + Analyzing mean monthly earnings helps stakeholders understand income disparities across different demographic groups, occupations, and industries.
* Business Strategy:
  + Businesses use earnings data to inform compensation strategies, talent acquisition, and market positioning within specific industries and occupations.

By addressing these challenges, the Europe Average Monthly Earnings Report aims to empower stakeholders with actionable insights to make informed decisions and drive positive change within the European labor market.

**Next Steps:**

The documentation will provide detailed information about each section of the reporting solution:

* Landing Page (LP): Offers an overview of the report and instructions for navigation.
* Average Earnings Overview: Focuses on mean monthly earnings across different regions. Analyzes earnings disparities between genders and compares earnings across different age groups.
* Occupation Earnings Analysis: It analyzes earnings in specific industries in different regions, age groups, and gender.

# Data Used

**Introduction:**

In this section of the documentation, we will provide details about the data used in the Europe Average Monthly Earnings Analysis. Understanding the data source and its structure is crucial for interpreting the insights derived from the report.

**Data Source:**

The Europe Average Monthly Earnings Report utilizes data collected from national statistical agency Eurostat provides insights into labor market trends and earnings distributions.

**Data Structure:**

The dataset used for the analysis is structured in a tabular format, typically organized into rows and columns. The dataset used in the report consists of one main table - “Mean Monthly Earnings”.

* Country: The location associated with the data, which is related to different countries.
* Measure Unit: The unit of measurement for the earnings values individuals, which could be categorized as Euro or PPS. The purchasing power standard (“PPS”) is an artificial currency unit. Theoretically, one PPS can buy the same amount of goods and services in each country.
* Gender: The gender of individuals, which could be categorized as male or female.
* Age Class: Classifications or categories related to the age of individuals.
* Occupation: Classifications or categories related to different occupations or job roles.
* Avg. Monthly Earnings: The numerical value representing the mean monthly earnings. Values are based solely on gross earnings.

## Data Preprocessing

The raw data undergoes preprocessing to ensure quality and consistency. Steps include data cleaning, transforming data types, handling missing values, and aggregating data for analysis.

# Average Earnings Overview

Charts:

* Map – “Avg. Earnings by Country”
  + Metric: Average Monthly Earnings by Country.
  + Insight:
    - Visualize the distribution of average monthly earnings across different countries within Europe. Identify regions with higher or lower average earnings to understand geographic variations in income levels.
    - The countries with the highest earnings are in the northern and central parts of Europe, while those with the lowest are in the eastern part of Europe.
* Box plot – “Avg. Earnings”
  + Metric: Average Monthly Earnings, Box plot metrics (minimum, 25th percentile, average, median, 75th percentile, maximum, IQR)
  + DAX Code:
    - MinValue = MINX('Mean Monthly Earnings', 'Mean Monthly Earnings'[Avg. Monthly Earnings])
    - Q1 = PERCENTILE.INC('Mean Monthly Earnings'[Avg. Monthly Earnings], 0.25)
    - Average = AVERAGE('Mean Monthly Earnings'[Avg. Monthly Earnings])
    - Median = MEDIANX('Mean Monthly Earnings', 'Mean Monthly Earnings'[Avg. Monthly Earnings])
    - Q3 = PERCENTILE.INC('Mean Monthly Earnings'[Avg. Monthly Earnings], 0.75)
    - MaxValue = MAXX('Mean Monthly Earnings', 'Mean Monthly Earnings'[Avg. Monthly Earnings])
    - IQR = [Q3] - [Q1]
  + Insight:
    - Explore the distribution of average monthly earnings using box plot visualization. Understand the central tendency, spread, and variability of earnings data to identify outliers and assess the overall distribution.
    - Whisker Max is very far away from the other points, this means that the data is skewed due to outliers (the Q3-Max group of people who earn significantly more than those in the Min-Q3 group). The data in the central area is not very varied because the box size is small. Median and Average are close to each other and are in the center of the box, this means that the data in the central area is evenly distributed.
* Bar chart – “Avg. Earnings by Country”
  + Metric: Average Monthly Earnings by Country
  + Insight:
    - Compare the average monthly earnings across different countries to identify regions with higher or lower income levels. Understand the geographic distribution of earnings to inform policy decisions and resource allocation.
    - Some countries in the ranking by Euro and PPS change their positions relative to others. This may mean that a country will be ranked higher according to PPS because of its lower cost of living.
* Column chart – “Top 10 Avg. Earnings by Country and Gender”
  + Metric: Average Monthly Earnings by Country and Gender
  + Insight:
    - Analyze the top 10 countries ranked by average monthly earnings, segmented by gender. Identify gender-based disparities in earnings across different countries and assess the magnitude of the wage gap.
    - In all countries, men earn more than women, and the size of the wage gap is at a similar level.
* Column chart – “Top 5 Avg. Earnings by Country and Age Class”
  + Metric: Average Monthly Earnings by Age Class
  + Insight:
    - Explore the top 5 countries with the highest average monthly earnings, categorized by age class. Understand how earnings vary across different age groups within the top-performing countries.
    - In all countries, people under 30 earn the least, and in most countries, people over 50 earn the most.
* Box plot – “Avg. Earnings by Age Class”
  + Metric: Average Monthly Earnings by Age Class, Box plot metrics (minimum, 25th percentile, average, median, 75th percentile, maximum, IQR)
  + DAX Code:
    - MinValue = MINX('Mean Monthly Earnings', 'Mean Monthly Earnings'[Avg. Monthly Earnings])
    - Q1 = PERCENTILE.INC('Mean Monthly Earnings'[Avg. Monthly Earnings], 0.25)
    - Average = AVERAGE('Mean Monthly Earnings'[Avg. Monthly Earnings])
    - Median = MEDIANX('Mean Monthly Earnings', 'Mean Monthly Earnings'[Avg. Monthly Earnings])
    - Q3 = PERCENTILE.INC('Mean Monthly Earnings'[Avg. Monthly Earnings], 0.75)
    - MaxValue = MAXX('Mean Monthly Earnings', 'Mean Monthly Earnings'[Avg. Monthly Earnings])
    - IQR = [Q3] - [Q1]
  + Insight:
    - Visualize the distribution of average monthly earnings by age class using a box plot. Identify age-related trends and variations in earnings distribution to understand income dynamics across different age groups.
    - For all age classes, whisker Max is very far away from the other points, this means that the data is skewed due to outliers (the Q3-Max group of people who earn significantly more than those in the Min-Q3 group). The data in the central area is not very varied because the box size is small. Median and Average are close to each other and are in the center of the box, this means that the data in the central area is evenly distributed.
* Box plot – “Avg. Earnings by Gender”
  + Metric: Average Monthly Earnings by Gender, Box plot metrics (minimum, 25th percentile, average, median, 75th percentile, maximum, IQR)
  + DAX Code:
    - MinValue = MINX('Mean Monthly Earnings', 'Mean Monthly Earnings'[Avg. Monthly Earnings])
    - Q1 = PERCENTILE.INC('Mean Monthly Earnings'[Avg. Monthly Earnings], 0.25)
    - Average = AVERAGE('Mean Monthly Earnings'[Avg. Monthly Earnings])
    - Median = MEDIANX('Mean Monthly Earnings', 'Mean Monthly Earnings'[Avg. Monthly Earnings])
    - Q3 = PERCENTILE.INC('Mean Monthly Earnings'[Avg. Monthly Earnings], 0.75)
    - MaxValue = MAXX('Mean Monthly Earnings', 'Mean Monthly Earnings'[Avg. Monthly Earnings])
    - IQR = [Q3] - [Q1]
  + Insight:
    - Explore the distribution of average monthly earnings by gender using a box plot. Identify gender-based disparities in earnings distribution and assess the magnitude of the wage gap between male and female earners.
    - For both genders, whisker Max is very far away from the other points, this means that the data is skewed due to outliers (the Q3-Max group of people who earn significantly more than those in the Min-Q3 group). The data in the central area is not very varied because the box size is small. Median and Average are close to each other and are in the center of the box, this means that the data in the central area is evenly distributed.
* Column chart – “Avg. Earnings by Gender and Age Class”
  + Metric: Average Monthly Earnings by Age Class
  + Insight:
    - Analyze average monthly earnings by gender and age class to understand intersectional dynamics of income disparities. Identify age and gender groups that experience higher or lower earnings compared to others.
    - Regardless of gender, earnings for age groups are the same: those over 50 earn the most, and those under 30 earn the least.
* Bar chart – “Avg. Earnings by Gender”
  + Metric: Average Monthly Earnings by Gender
  + Insight:
    - Compare the average monthly earnings between male and female earners to understand gender-based wage disparities. Identify areas where gender inequality in earnings is more pronounced.
    - Men earn more than women for both the Euro and the PPS.
* Bar chart – “Avg. Earnings by Age Class”
  + Metric: Average Monthly Earnings by Age Class
  + Insight:
    - Analyze average monthly earnings across different age groups to understand age-related trends in income levels. Identify age cohorts that experience higher or lower earnings compared to others.
    - Those over 50 earn the most and those under 30 earn the least, both in euros and PPS.

# Occupation Earnings Analysis

Charts:

* Box plot – “Avg. Earnings by Occupation”
  + Metric: Average Monthly Earnings by Occupation, Box plot metrics (minimum, 25th percentile, average, median, 75th percentile, maximum, IQR)
  + DAX Code:
    - MinValue = MINX('Mean Monthly Earnings', 'Mean Monthly Earnings'[Avg. Monthly Earnings])
    - Q1 = PERCENTILE.INC('Mean Monthly Earnings'[Avg. Monthly Earnings], 0.25)
    - Average = AVERAGE('Mean Monthly Earnings'[Avg. Monthly Earnings])
    - Median = MEDIANX('Mean Monthly Earnings', 'Mean Monthly Earnings'[Avg. Monthly Earnings])
    - Q3 = PERCENTILE.INC('Mean Monthly Earnings'[Avg. Monthly Earnings], 0.75)
    - MaxValue = MAXX('Mean Monthly Earnings', 'Mean Monthly Earnings'[Avg. Monthly Earnings])
    - IQR = [Q3] - [Q1]
  + Insight:
    - Explore the distribution of average monthly earnings by occupation using a box plot. Understand variations in earnings among different occupational groups and identify occupations with higher or lower income levels.
    - The exception here is the chart for "Armed Forces Occupations," as the whisker max is not as far off as in the other occupations. The range of the lower quartile is larger, so the distribution of central tendency is more toward the upper side, and some outliers are affecting the average. The reason may be the availability of data for this occupation from only 5 countries. For the rest of the occupations, whisker Max is very far away from the other points, this means that the data is skewed due to outliers (the Q3-Max group of people who earn significantly more than those in the Min-Q3 group). The data in the central area is not very varied because the box size is small. Median and Average are close to each other and are in the center of the box, this means that the data in the central area is evenly distributed.
* Treemap – “Top 5 Avg. Earnings by Country and Occupation”
  + Metric: Average Monthly Earnings by Country and Occupation
  + Insight:
    - Visualize the top 5 countries and their respective top-earning occupations. Understand the distribution of earnings across countries and occupations to identify key contributors to overall income levels.
    - The distribution of earnings in all countries is similar. The top-earning occupations are Managers, Professionals, Technicians and associate professionals. The lowest-paid occupations are Elementary occupations, Service and sales workers.
* Bar chart – “Avg. Earnings by Occupation”
  + Metric: Average Monthly Earnings by Occupation
  + Insight:
    - Compare average monthly earnings across different occupations to understand income differentials within the labor market. Identify occupations with higher or lower average earnings to inform career choices and workforce planning.
    - Managers earn the most, Elementary occupations earn the least.
* Column chart – “Avg. Earnings by Occupation and Gender”
  + Metric: Average Monthly Earnings by Occupation and Gender
  + Insight:
    - Analyze average monthly earnings by occupation and gender to identify disparities in earnings within occupational categories. Understand how gender influences income levels across different occupations.
    - Men earn more than women regardless of occupation.
* Column chart – “Avg. Earnings by Occupation and Age Class”
  + Metric: Average Monthly Earnings by Occupation and Age Class
  + Insight:
    - Explore average monthly earnings by occupation and age class to understand age-related dynamics in occupational earnings. Identify age cohorts within occupations that experience higher or lower earnings.
    - People over 50 earn the most and those under 30 earn the least regardless of occupation.
* Donut chart – “Distribution of Avg. Earnings by Age Class”
  + Metric: Average Monthly Earnings by Age Class
  + Insight:
    - Visualize the distribution of average monthly earnings across different age groups using a donut chart. Understand the proportion of earnings contributed by each age cohort to assess age-related income dynamics.
* Donut chart – “Distribution of Avg. Earnings by Gender”
  + Metric: Average Monthly Earnings by Gender
  + Insight:
    - Visualize the distribution of average monthly earnings between male and female earners using a donut chart. Understand the gender composition of earnings distribution and identify areas of gender disparity in income levels.

# Solution Approach

## Introduction

In this section of the documentation, we will discuss the approach taken to solve the business problem outlined in Part 1. The Europe Average Monthly Earnings Report provides a comprehensive reporting solution to address the challenges faced by stakeholders.

## Solution Approach

The Europe Average Monthly Earnings Report was developed using a systematic approach:

1. Data Collection: Gathered data from [reputable source](https://data.europa.eu/data/datasets/f26eoqiquywllgwsjtdqlq?locale=en).
2. Data Preparation: Preprocessed the data using [SQL](https://github.com/kon-mat/DataAnalysis/blob/aa0720428218926acdac86d7b1ccb85ab3775cec/PowerBI/Projects/Average%20Monthly%20Earnings%20EU/Dataset%20files/vwMeanMonthlyEarnings.sql) to ensure it is suitable for analysis.
3. Data Modeling: Modeled the data in Power BI to create a structured data model.
4. Calculated Measures: Developed DAX measures to calculate key metrics and KPIs.
5. Report Design: Designed the report in Power BI, focusing on intuitive visualization and user interaction.

## Benefits and Insights

The Europe Average Monthly Earnings Report provides stakeholders with several benefits:

* Empowers stakeholders to make informed decisions related to policy formulation, business strategy, and resource allocation.
* Helps identify income disparities and inform efforts to reduce inequality within the European labor market.
* Provides insights for businesses to optimize compensation strategies, talent acquisition, and market positioning.

## Conclusion

The Europe Average Monthly Earnings Report offers a robust solution to address income disparities and inform decision-making within the European labor market.