Part 1

Question 1. Problem explanation and visualisation link

https://www.tableau.com/blog/china-and-renewable-energy

The ‘China and Renewable Energy’ visualisation focuses on the problem of suboptimal decision-making in the field of the renewable energy sector. The visualisation presents an interactive picture of China’s renewable energy development with respect to capacity, growth, and investment in renewable sources over the years. It helps the users to locate the region where renewable energy is produced most effectively and make further.

Question 2. To analyse this visualisation, let's apply Berinato's Framework.

Berinato's Framework categorises data visualisations into four types:

Idea Illustration, Idea Generation, Visual Discovery, and Everyday Dataviz

(Harvard Business Review, 2016)

- Idea Illustration: Visualisation simplifies complex datasets which makes it simple for the audience to grasp the insights. This helps to present a point clearly to the spectators, making it easy to convey the key message quickly.
- Idea Generation: This makes it straightforward for the users to recognise patterns across different regions. It also makes it optimal for investors to identify inefficiencies and brainstorm creative ideas to tackle these challenges and

introduce new sources of clean energy through innovations. The prime focus is on generating new ideas and exploring the data.

- Visual Discovery: It allows users to inspect large amounts of data interactively, revealing hidden insights and relationships between factors influencing China's renewable energy production and capacity. This visual discovery process is crucial for making educated and strategic judgments on renewable energy planning.
- Everyday Dataviz: Data visualisation makes it easy for managers and researchers to obtain a consistent image of renewable energy production capacity, as well as track and monitor its progress. This helps to discover areas for improvement and provides vital information for daily decision-making.

Question 3. Critical Reflection Using Visual Grammar

Visual grammar refers to the elements and rules used to describe the characteristics of data visualisations created developed.

Good Practices:

1. Effective use of colours to depict growth: The visualisation uses colour gradients to represent global development in renewable energy capacity. For example, areas with higher growth rates are darker and more vibrant while regions with slower growth are in lighter shades.

2. Interactive regional exploration: Users can explore about different regions worldwide by hovering over highlighted areas. This provides them with energy and investment

data, making it quicker to compare regional growth. It also gives detailed information on renewable energy potential and investment opportunities.

3. Clear legend and detailed tooltip: This Visualisation has a well-designed legend that explains the colours schemes and renewable capacity. The interactive tooltips appears when users hover over specific regions or data points, providing detailed information about the visualisation.

Areas for Improvement:

1. Detailed insights on sub-regions: While it provides a solid overview at the country level, including city-level data would allow for a more detailed analysis of renewable energy growth and investment in specific areas.

2. Simplification of overlapping regions: The visualisation might get confusing in spots where multiple regions or data points overlap, like where provincial borders meet. This ay become tough for non-professionals to interpret and draw insights.

3. Clarity of investment visual: The investment visualisation could benefit by making it clearer. Using Shaffer’s 4C's principles, a more precise design can be developed which would improve the visualisation. This would make it easier to convey and understand the key points.

Part-2

Question 1.

In the research on the business model of renewable energy providers specifically in the hydropower field, I noticed that all the models talk about their cost structure, investment plans, and revenue generation but very few of them account for carbon emission as well as their responsibility towards society and environment.

Hydro EU, a leading hydropower provider in Europe, is struggling to manage its diversified plants across Europe due to a lack of real-time updates about the plant's operations and management which has led to inefficient planning and suboptimal decision-making.

To address these issues, the plan is to create an interactive data visualisation for optimal asset management and enhanced decision-making. The goal is to enhance Hydro EU's operational efficiency, optimise asset management, and provide real-time insights from high-volume data to managers with a comprehensive overview of operations for better functioning, identification of underperforming assets, and do predictive analysis for investing in areas that are well-performing for its expansion.

Some necessary information like years of operation, revenue generation, regulatory compliance, and other factors like carbon emission, sources of water, impact on the marine ecosystem, and flood management protocols were not mentioned.

The assumptions are that Hydro EU has the necessary resources and infrastructure for real-time processing, depreciation is implemented for 4 years on machineries, laws and regulations are being followed, and there is sufficient cash flow for expansion in case of requirement.

Question 2.

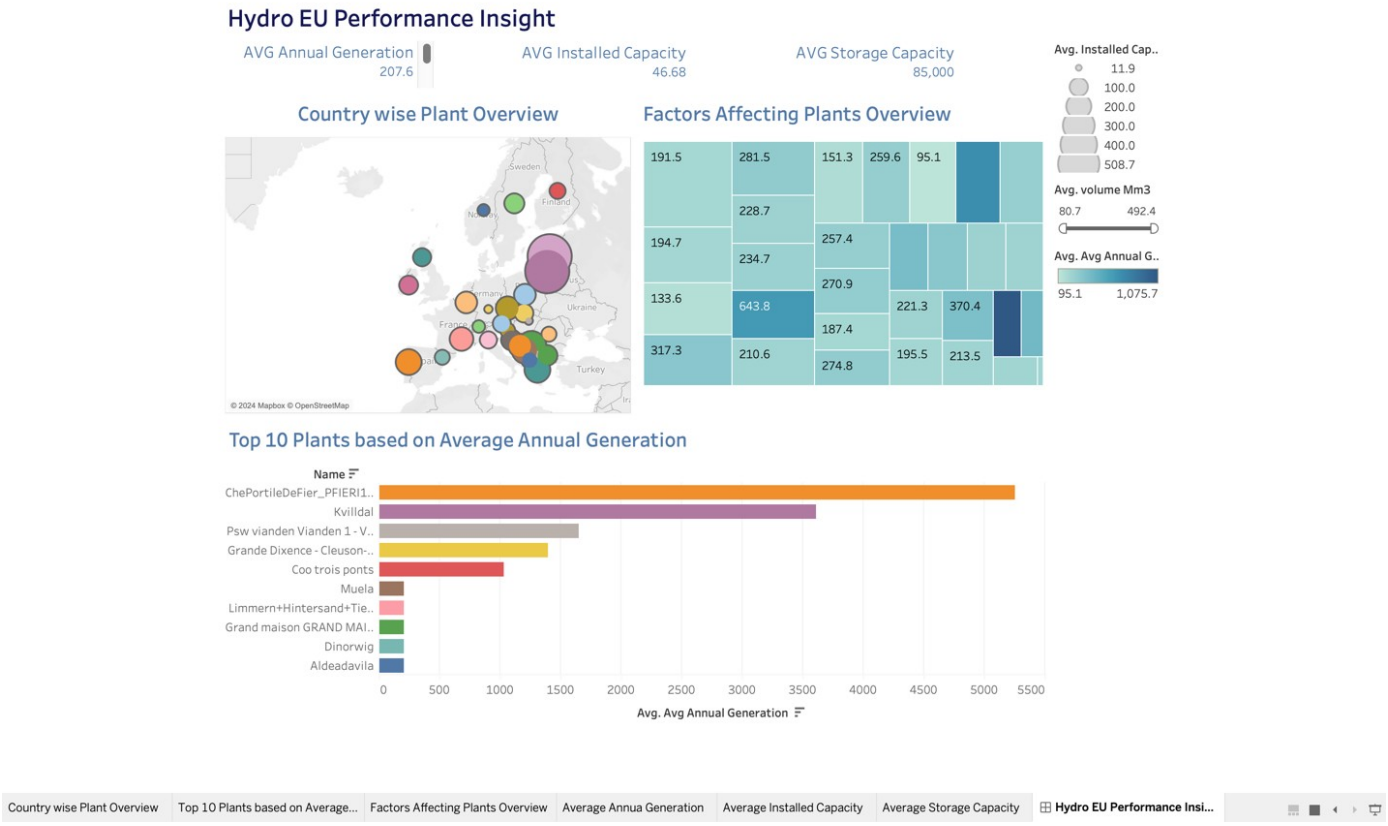
While conducting the analysis, I came across multiple null and missing values in the dam height, volume, pumping capacity, storage capacity, average annual generation capacity, installed capacity, Pypsa ID, GEO, and WRI columns, which presented a significant problem.

Due to the vast size of the dataset provided, simply eliminating the missing values wasn't an option because it could skew the results which would lead to unjust and unclear conclusions. To rectify this, I chose to substitute the null values with the average of the corresponding fields to gain a better understanding of the data. This ensured a fair and unbiased analysis for these columns, which could be essential for formulating policies related to financial and operational aspects of the business model that directly concerns the board of the company. Specifically, the columns on dam height, volume, pumping capacity, storage capacity, average annual generation capacity, and installed capacity columns were required for the construction of data visualisation, based on my understanding of the project’s business requirements. This data transformation was conducted to maintain the integrity of the dataset and prevent any skewness.

To provide a more reliable study, I looked for outliers and standardised the units across all important criteria to ensure that the data was uniform and consistent.

Once the dataset was cleaned and necessary changes were made, I loaded it into Tableau for the preparation of visualisations. This dataset compromise of both, nominal and categorical data. This provides a full overview of the company's operations.

Question 3.



The 'Hydro EU Performance Insight' dashboard has been meticulously created, including the necessary worksheets from Tableau to provide a thorough picture of the key elements that affect Hydro EU's performance. It ensures that the data is

consolidated onto a single, interactive platform. This allows the managers and decision-makers to quickly understand the aspects that are most impactful in relation to the company’s operations. It is extremely user-friendly, and the users can easily examine various elements by hovering over certain data points on the treemap. This dynamically reveals the related information across other visualisations on the dashboard. It is valuable because managers can drill down into the details that are most important to them which would saves their time and extra effort, providing a deeper understanding by simply overviewing the dashboard.

Additionally, users can also customise the dashboard by applying filters to meet their individual needs. This keeps the dashboard relevant and adaptable to different analytical requirements to extract the precise information needed by the users. It also enables stakeholders to focus on the areas that are most impactful and ignores the less relevant aspects.

At the top, the dashboard highlights three critical parameters that provide a quick snapshot of the overall performance of the hydropower plants. Users can immediately see how much energy is being generated on average, the installed capacity across plants, and the storage potential, all of which are crucial for understanding the power generation process.

The Country wise Plant Overview worksheet visually represents Hydro EU's plants. The size of the circles indicates the installed capacity, while the colour coding helps to differentiate between various countries. This allows the managers to quickly assess which regions have the most significant power generation capacity, helping to identify the future opportunities for modifications.

The treemap on the right side of the dashboard depicts a variety of factors, such as dam height, volume, and storage capacity which are vibrantly coloured to show their impact on average annual generation. It is useful for understanding the relationship between different factors and their influence on the efficiency of the plants. Managers can hover over each block to see detailed metrics that will help them make informed decisions.

The bar chart at the bottom of the dashboard lists the top 10 hydroelectric plants based on their average annual energy generation. This helps to identify the plants that are most productive. By focusing on these top performers, the company can maximise its return on investment and strategically plan for future developments.

Overall, this dashboard is designed to be user-friendly, allowing managers to interact with the data and extract the most relevant information for their purposes. The use of geographic, comparative, and ranking visualisations provides a comprehensive overview of the company’s operations. This approach ensures that the management team can effectively prioritise the resources, identify areas for improvement, and move the organisation towards its objectives.

References

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