

# **ADVANCING IKEA'S SUSTAINABILITY GOALS THROUGH RENEWABLE ENERGY AND ECONOMIC INDICATORS**

Group 5

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# Business Problem Overview

Company: IKEA - Global Leader in Home Furnishings

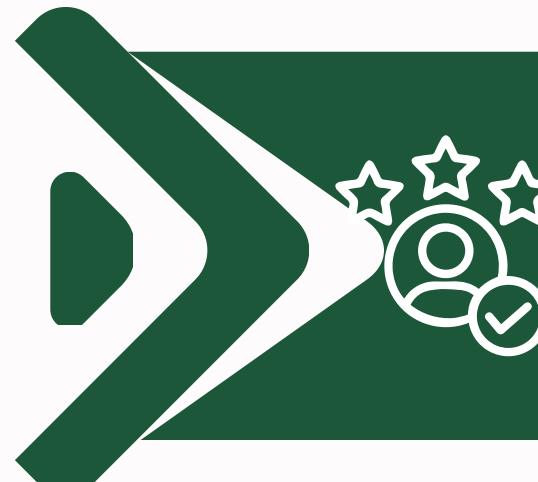


## Challenge:

- Prioritize and invest in sustainability initiatives.
- Optimize resource allocation and practices.

## Objective:

- Use data-driven insights to improve sustainability impact.
- Align with IKEA's strategic framework.



## Project Goal:

- Create a predictive model for sustainability investments.
- Enhance decision-making and achieve SDG-aligned targets.

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# Analytics Questions

01

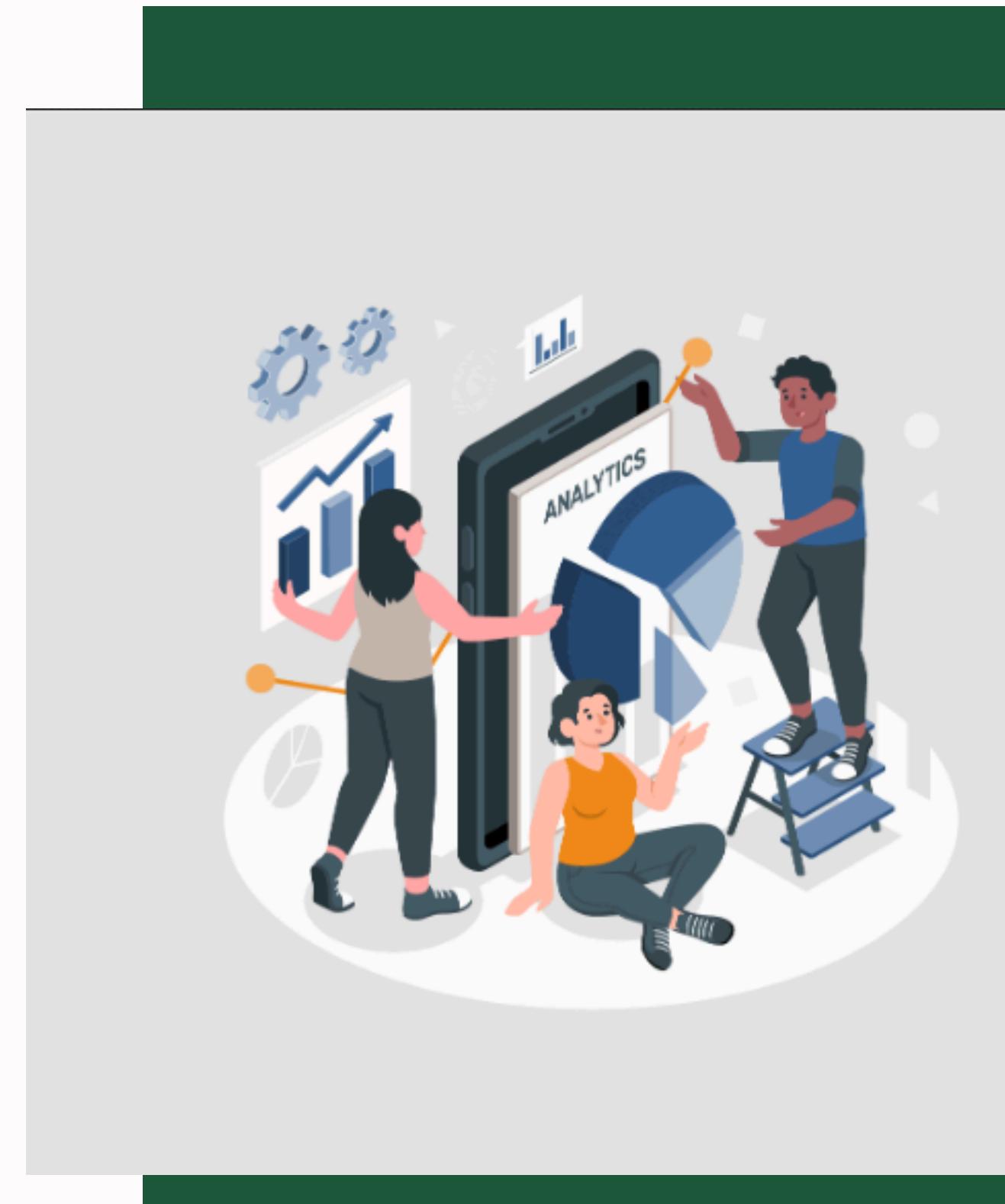
Countries having Highest Potential for Sustainable Development Investments?

02

Areas having Strongest Markets for Economic Growth and Innovation?

03

In which countries can IKEA's investment have the most significant overall impact on advancing?



# Scope Statement

## Objectives:

- Develop models to predict and enhance sustainability performance.
- Identify strategic investment areas.
- Utilize Power BI dashboards for data visualization and decision making

## Scope & Deliverables:

- Focus on sustainability data analysis up to 2023
- Deliver a comprehensive analytical report and implementation
- guidelines within IKEA's frameworks.

## Exclusions:

Excludes detailed financial planning and full operational rollout.





# Data Sources/Key Data Entities and Flows

## Data Sources

- IKEA Reports: Sustainability outcomes.
- The datasets published in conjunction with the 2023 Paris Summit for a New Global Financial Pact.
- 



### Key Data Entities

- Sustainability and Operational Metrics: SDG scores, energy usage, waste management.
- Investment Records: Past sustainability projects.

### Data Flows

- Collection and Processing: Data gathered from internal and external APIs, cleaned, and standardized.
- Storage and Integration: Managed in a centralized data warehouse
- Visualization: Utilized in Power BI for dynamic insights.

### Challenges

Data Quality and Security: Ensures accuracy and manages privacy across varying data sources.

# Methodology

01



## Data Collection:

Gathered data from various sources  
Ensured data quality through preprocessing

02



## Data Analysis K-Means Clustering

Applied clustering to segment data  
Identified key clusters representing different sustainability performance levels

03



## Data Analysis Linear Regression

regression analysis to explore the relationship between economic indicators  
Identified significant predictors of IKEA's renewable energy adoption and economic benefits.

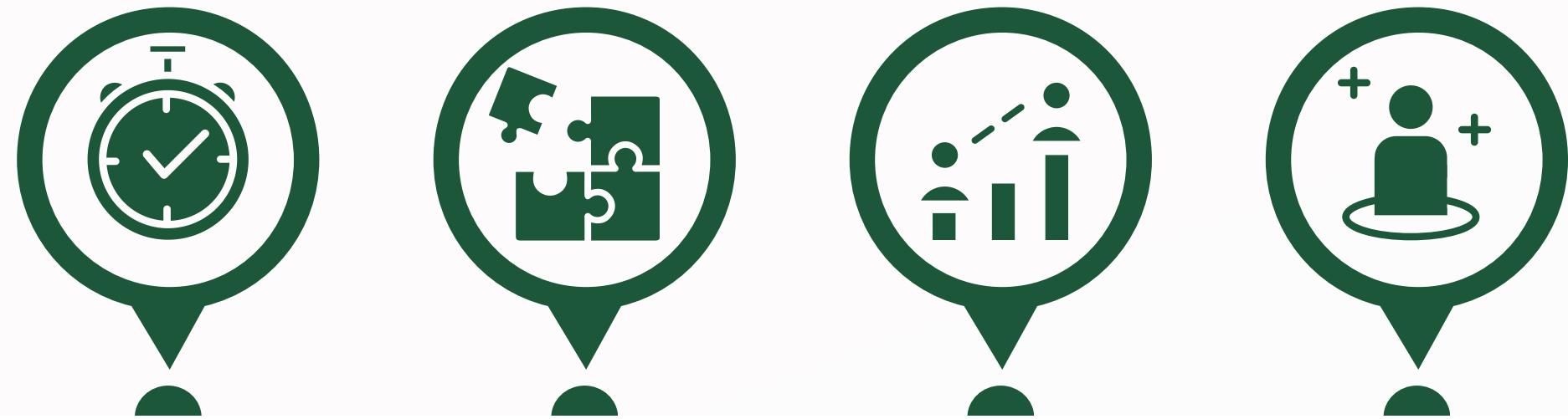
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## Visualization & Reporting Power BI Dashboard

Developed an interactive dashboard to visualize key insights  
Included dynamic charts and graphs

# Analysis of Linear Regression

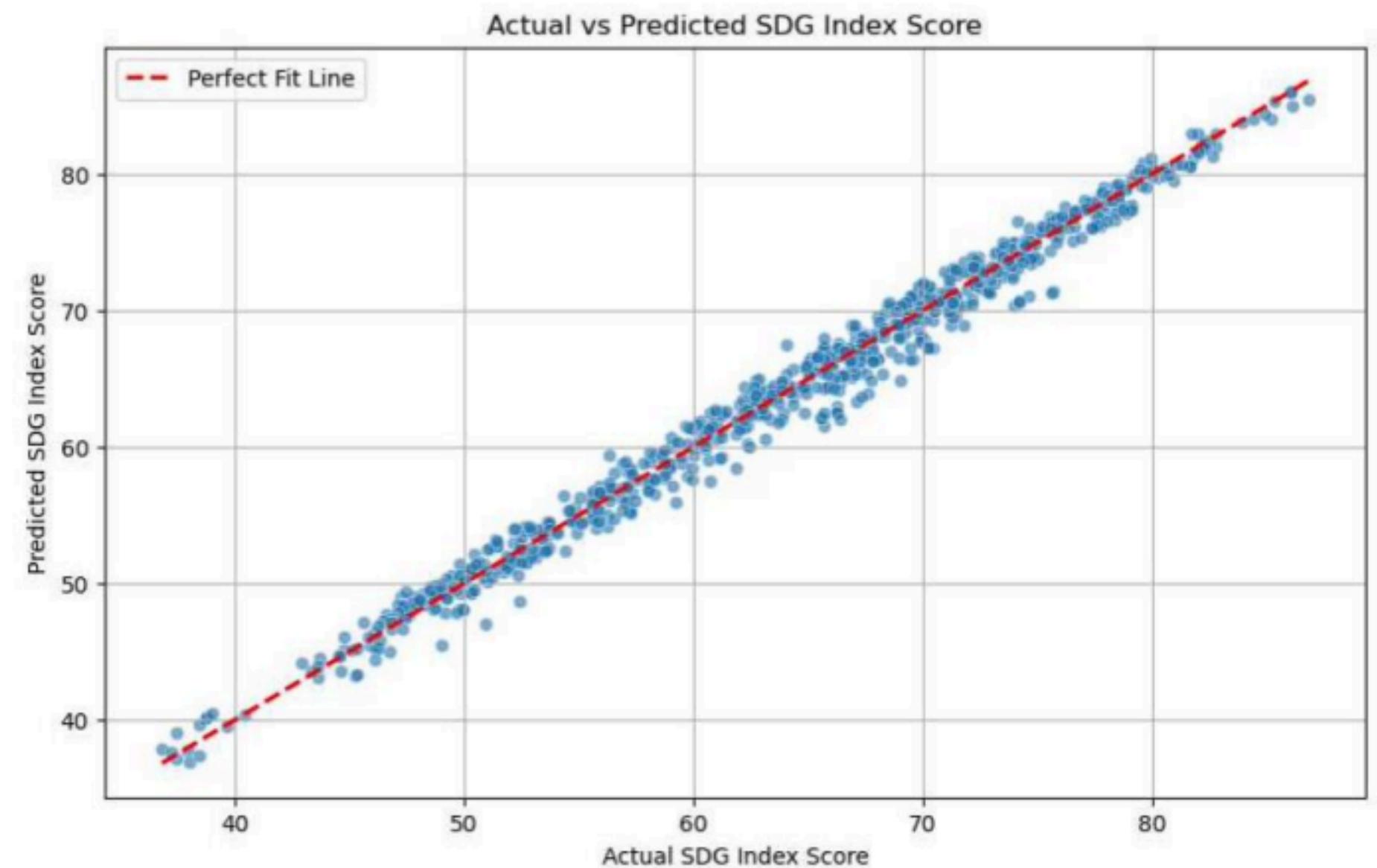


## Graph Overview:

- X-Axis: Actual SDG Index Score.
- Y-Axis: Predicted SDG Index Score.
- Red Line: Represents a perfect fit line, indicating where actual and predicted values are equal.

## Key Insights:

- High Correlation between actual and predicted values.
- linear regression model is highly effective in predicting the SDG Index Score



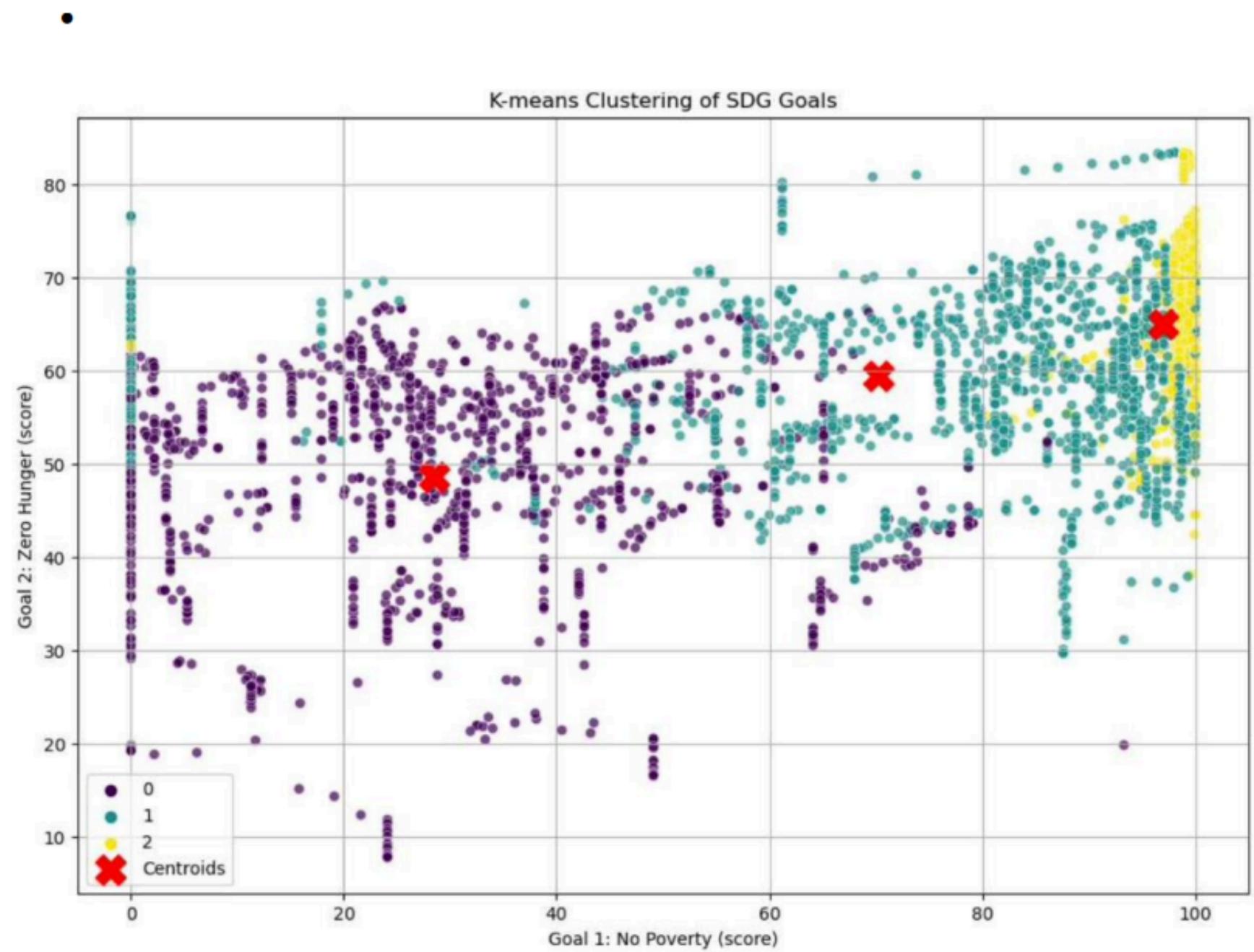
# K-Means Clustering of SDG Goals

## Graph Overview

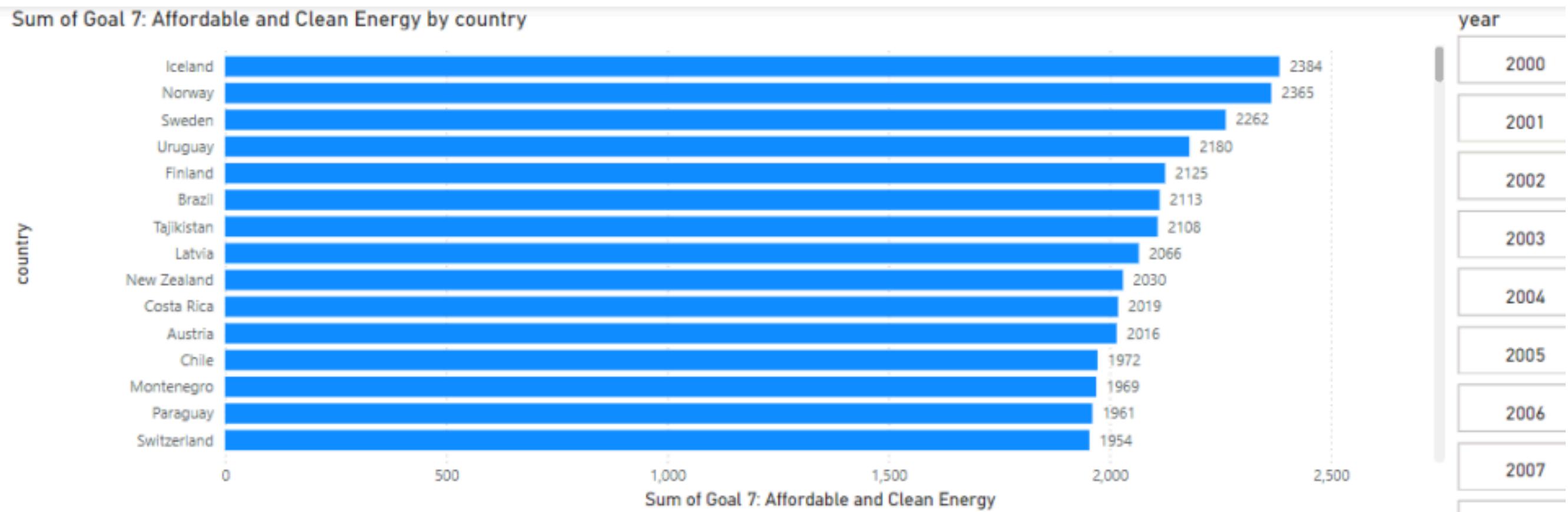
- X-Axis: Scores for Goal 1 (No Poverty).
- Y-Axis: Scores for Goal 2 (Zero Hunger).Clusters:
- The data points are color-coded based on their cluster assignment:  
Purple (Cluster 0), Cyan (Cluster 1), Yellow (Cluster 2)
- Red X Marks: Centroids representing the center of each cluster.

## Key Insights

- Cluster Distribution:
- Cluster 0 (Purple): Represents a group with moderate scores on both goals.
- Cluster 1 (Cyan): Represents a group with high performance on both goals, especially towards eliminating poverty.
- Cluster 2 (Yellow): Represents a group with high "No Poverty" scores but moderate "Zero Hunger" scores.
- Centroid Analysis: The red centroids indicate the average performance for each cluster, helping identify the central tendencies within the groups.

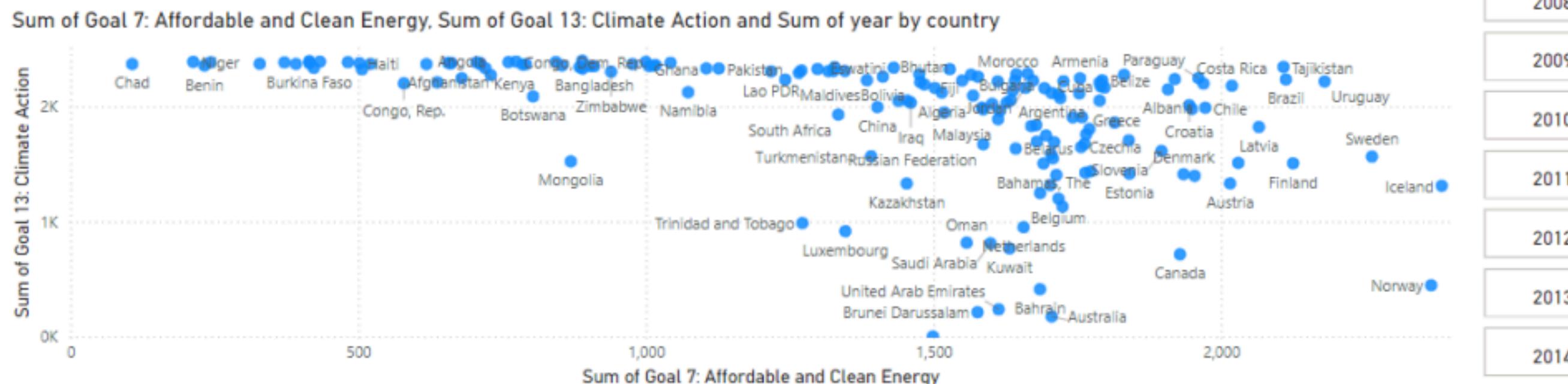


# Power BI Dashboard Analysis: Goal 7 (Affordable and Clean Energy) and Goal 13 (Climate Action)



**Top Bar Chart (Country vs. Goal 7 Performance):**  
Displays the sum of Goal 7 metrics by country.  
Countries like Iceland, Norway, and Sweden have the highest scores in Affordable and Clean Energy.

**Bottom Scatter Plot (Goal 7 vs. Goal 13 by Country):**  
Plots the relationship between Goal 7 and Goal 13 across countries and years.  
Identifies countries excelling in both goals (e.g., Iceland, Norway) and those that lag behind.



# Optimization

## Initial Challenges

Linear Regression Model:

- High  $R^2$  score but significant overfitting, affecting generalizability.
- Complexity in interpretation due to numerous variables.

K-Means Clustering:

- Initial clustering didn't align well with IKEA's sustainability goals.
- Need for more refined segmentation criteria.

## Optimization Steps:

Algorithm Enhancement:

- Linear Regression:
  - Regularization Techniques: Reduced overfitting to improve generalizability.
  - Feature Selection: Removed irrelevant features to streamline the model and enhance interpretability.
- K-Means Clustering:
  - Refinement of Clusters: Used the Elbow Method to determine optimal clusters.
  - Additional Criteria: Incorporated renewable energy share and carbon emissions for better alignment with sustainability goals.



# Optimization

## Iterative Model Tuning

- Cross-Validation: Ensured model robustness by validating on different data subsets.
- Error Analysis: Analyzed and adjusted based on prediction errors to enhance performance.

## Dashboard Enhancements

- Dynamic Elements: Added sliders and filters in Power BI for interactive data exploration.
- Improved Navigation: Organized dashboards into intuitive sections for a better user experience.

## Data Handling

- Data Cleaning: Ensured data accuracy and consistency through thorough cleaning and standardization.
- Efficient Storage: Adopted efficient storage solutions for quick data access during analysis.





# Recommendations

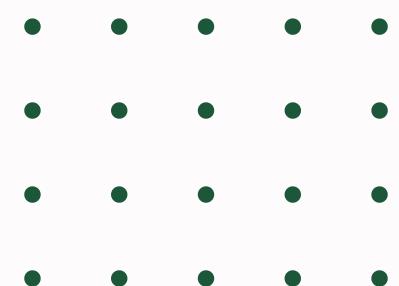
- Focus on Data-Driven Decision Making
- Continuous Monitoring
- Regular update of models and dashboards to track progress

# Future Enhancement

- Incorporate Advanced Analytics
- Global Sustainability Integration
- Real-Time Data Integration:

# Path Forward

- Ongoing model refinement and real-time data integration will ensure IKEA remains at the forefront of sustainability and innovation.



# THANK YOU

