ESG KPIs for Monitoring Water Usage and GHG Emissions

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Introduction

- ESG (Environmental, Social, and Governance) KPIs help companies measure their performance in sustainable and ethical practices.
- This presentation covers examples of KPIs for Environmental, Social, and Governance aspects.
- We will also demonstrate how AI can predict KPIs using the water usage as an example.

Environmental KPIs

- **GHG Emissions**
  - Measures the total greenhouse gases emitted by the company.
  - Example: Reduce GHG emissions by 25% by 2025.
- **Energy Consumption**
  - Tracks the total energy used by the company from all sources (electricity, gas, renewable energy, etc.).
  - Example: Report total energy consumption in MWh annually.
- **Water Consumption**
  - Measures the total amount of water used by the company.
  - Example: Report total water usage in cubic meters annually.
- **Waste Generated**
  - Measures the total amount of waste produced.
  - Example: Report total waste generated in metric tons annually.

Social KPIs

- **Turnover Rates**
  - Measures the rate at which employees leave the company.
  - Example: Reduce turnover rates by 15% by 2023.
- **Percentage of Diverse Employees**
  - Tracks diversity in the workforce.
  - Example: Increase percentage of diverse employees by 20% by 2024.
- **Pay Equity Ratios**
  - Measures the pay gap between different groups.
  - Example: Achieve pay equity by 2025.
- **Number of Product Recalls**
  - Measures the number of product recalls due to safety issues.
  - Example: Maintain zero product recalls annually.

Governance KPIs

- **Board Diversity**
  - Measures diversity within the company's board.
  - Example: Achieve 40% board diversity by 2023.
- **Number of Ethical Training Hours**
  - Measures the total hours of ethical training completed by employees.
  - Example: Increase ethical training hours by 30% by 2024.
- **Number of Data Breaches**
  - Measures the number of data breaches the company experiences.
  - Example: Maintain zero data breaches annually.
- **Response Time to Data Breaches**
  - Measures the time taken to respond to data breaches.
  - Example: Reduce average response time to data breaches to under 24 hours.

Predicting Water Usage with AI

- AI can be used to predict water usage, enabling proactive management and resource optimization.
- Key steps in the prediction process:

Step 1: Data Collection

- Collect relevant data for water usage prediction:
  - Historical water usage data.
  - Environmental data (temperature, humidity).
  - Production data (production levels, operational hours).
  - Workforce data (number of employees, shifts).

Step 2: Data Preprocessing

- Clean and preprocess the data:
  - Handle missing values.
  - Encode categorical variables.
  - Scale numerical features.

Step 3: Feature Engineering

- Create new features to improve the model's accuracy:
  - Seasonal components (e.g., monthly averages).
  - Lag features (e.g., water usage from previous weeks).
  - Interaction terms (e.g., interaction between temperature and production level).

Step 4: Model Training

- Train a neural network model to predict water usage:
  - Define the neural network architecture.
  - Compile the model with appropriate loss function and optimizer.
  - Train the model on the training dataset.

Step 5: Model Evaluation

- Evaluate the model using test data:
  - Calculate metrics such as Mean Squared Error (MSE), Mean Absolute Error (MAE), and R-squared.
  - Plot training history to observe performance over epochs.

Step 6: Prediction and Scenario Analysis

- Use the trained model to predict water usage under various scenarios:
  - Predict future water usage based on planned production increases.
  - Assess the impact of environmental changes on water usage.
- Implement these predictions into the company's resource management strategy.

Expanding Focus: From Water Usage to GHG Emissions

- While monitoring water usage is critical, another key ESG KPI is GHG emissions.
- Reducing GHG emissions is essential for aligning with global sustainability goals like the Paris Agreement.
- Next, we will explore a group activity focused on developing strategies to monitor and reduce GHG emissions.

Group Activity: Developing a Strategy to Monitor and Reduce GHG Emissions

- Objective: Discuss and develop a strategic plan for monitoring and reducing GHG emissions as part of a company's ESG initiatives.
- Focus: Identify key emission sources, relevant KPIs, data collection methods, and potential reduction strategies.
- Outcome: Each group will present their strategy, highlighting challenges and solutions.

Scenario Overview

- You are part of the sustainability team at an international manufacturing company.
- The company aims to reduce its GHG emissions by 40% over the next decade in line with the Paris Agreement.
- The challenge: Develop a comprehensive system to monitor and manage GHG emissions across multiple regions and operations.

Discussion Points for Your Group

- **Identify Key Emission Sources:** Where do most of the GHG emissions come from in your company?
- **Choose Relevant KPIs:** What KPIs should be tracked?
- **Data Collection:** What data do you need? How will you gather and integrate it across different sites?
- **Reduction Strategies:** How can the company reduce emissions?
- **Challenges and Solutions:** What challenges might you face? How will you overcome them?

Group Presentation Instructions

- Each group will have 5-7 minutes to present their strategy.
- Focus on:
  - Key emission sources and chosen KPIs.
  - Data collection methods and challenges.
  - Proposed strategies for reducing GHG emissions.
  - Anticipated challenges and solutions.
- Be prepared to answer questions and discuss your approach with the class.

Class Discussion

- After all groups have presented, we will have an open discussion.
- Topics to explore:
  - Differences and similarities in group strategies.
  - Feasibility and practicality of proposed solutions.
  - New ideas or perspectives that emerged during the presentations.

Summary and Key Takeaways

- Monitoring ESG KPIs is crucial for sustainability and ESG compliance.
- Data-driven strategies can significantly enhance the effectiveness of these initiatives.
- Collaboration and strategic planning are key to overcoming challenges in ESG implementation.
- Continuous improvement and adaptation are necessary to meet long-term sustainability goals.
- AI-powered predictions allow for proactive decision-making and improved efficiency.

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