### Project Title: AI-Driven Supply Chain Disruption Predictor and Inventory Optimization System

### Project Statement:

This project will develop an AI-powered system that transforms supply chain management by monitoring global data, predicting disruptions, and optimizing inventory. Leveraging advanced Natural Language Processing (NLP) models such as OpenAI GPT and Meta's LLaMA for data analysis, the system will integrate seamlessly with tools like Google Sheets for data tracking, and provide real-time alerts via Slack or email. The core goal is to forecast potential disruptions in the supply chain, automate inventory adjustments, and enable businesses to respond proactively to global uncertainties, ensuring efficiency and minimizing losses.

### Key Outcomes:

* **Accurate Disruption Predictions**: By analyzing news, supplier data, and transportation trends, the system will predict supply chain disruptions in advance, helping businesses plan better.
* **Dynamic Inventory Optimization**: Adjust inventory levels based on predicted disruptions and supply chain reliability, optimizing stock management.
* **Real-Time Alerts**: Automated alerts will notify decision-makers about disruption risks, inventory needs, and reordering actions via Slack or email.
* **Improved Operational Efficiency**: Proactive risk management will reduce losses caused by supply chain interruptions, improving overall business operations.

### Modules to be Implemented:

**1)Global Data Monitoring and Analysis Engine**

**Objective**: Use NLP to process global data (news articles, supplier updates, transportation trends) to detect potential risks in the supply chain.

**Functionality**:

* Automatically scrape and analyze news articles, market reports, and social media data.Identify key events or changes (e.g., geopolitical events, natural disasters, strikes) that could impact the supply chain.
* Categorize and tag risk levels based on relevance to the business.
* Provide alerts or insights about emerging trends (e.g., shortage in raw materials, logistics bottlenecks).

1. **Predictive Disruption Modeling System**

**Objective**: Use machine learning (ML) models to predict future supply chain disruptions, based on historical data and real-time input.

**Functionality**:

* Train a predictive model using historical disruption data (e.g., previous disruptions, transportation delays, supply shortages).
* Use real-time data from the monitoring engine to adjust predictions dynamically.
* Assign risk scores for various scenarios (e.g., high risk, moderate risk, low risk) to help companies prioritize their actions.
* Provide probability assessments to estimate the likelihood of a disruption, factoring in the region, supplier history, and transportation trends.

1. **ERP Integration and Inventory Adjustment Module**

**Objective**: Automate inventory adjustments based on the disruption prediction, integrating seamlessly with existing ERP systems like SAP.

**Functionality**:

* Fetch data from ERP systems to assess current inventory levels and reorder points.
* Analyze disruption predictions and adjust reorder recommendations (e.g., stock up on critical items if a supply chain delay is predicted).
* Automate updates to the ERP system to reflect changes in inventory strategies and reorder needs.
* Provide data-driven inventory optimization suggestions (e.g., adjusting stock levels for specific products based on forecasted risks).

1. **Real-Time Alert and Reporting Dashboard**

**Objective**: Provide real-time alerts and reports to key stakeholders for swift decision-making.

**Functionality**:

* Deliver instant notifications via Slack or email to key team members when a potential disruption is identified or inventory adjustments are needed.
* Visualize disruption risks, inventory levels, and stock recommendations in a dashboard.
* Provide historical analysis and trend insights for supply chain managers to assess long-term performance.
* Allow custom configuration of alert thresholds and reporting schedules for different business units.

### System Architecture:

* **Data Sources**: Global news, transportation and logistics updates, market reports, social media platforms, and ERP data.
* **AI Components**: NLP for data processing (e.g., extracting sentiment and relevance from news articles), machine learning for predictive modeling, and data analysis for decision-making.
* **Integration**: Google Sheets for data storage, Slack/Email for notifications, and ERP systems (e.g., SAP) for inventory management.

### Key Benefits:

* **Proactive Risk Management**: Enables businesses to forecast and prepare for disruptions before they escalate.
* **Cost Reduction**: Minimized losses from stockouts, overstocking, and inefficient supply chain operations.
* **Operational Continuity**: Maintains smooth business operations despite external uncertainties and disruptions.
* **Improved Decision Making**: Data-driven insights help businesses make informed decisions regarding inventory, sourcing, and logistics.

### Future Expansion:

* **Global Scale**: Expand data sources to include a wider range of geopolitical, environmental, and economic data.
* **Advanced AI Models**: Incorporate more sophisticated models for better prediction accuracy, such as reinforcement learning.
* **Extended Integration**: Integrate with a wider range of ERP, warehouse management, and transportation management systems for full end-to-end supply chain optimization.