Asian Export Trade Analysis

Trade, Commodity Performance & INR - USD Growth

1. Project Overview and Objective

1.1. Project Overview

This project focuses on analysing export performance to various Asian countries using the provided dataset. The goal is to understand key trade patterns, identify opportunities for improvement, and develop insights that support strategic decision-making.

Using **Excel** for initial data cleaning and exploration and **Power BI** for interactive dashboards, the project will reveal how products, countries, and time periods influence export volume and revenue.

1.2. Project Objective

The objective of this project is to analyse export data to Asian countries in order to understand market performance, identify high-value products and countries, and uncover trends that support strategic decision-making.

The project aims to develop interactive dashboards and key insights that help improve export planning, optimize resource allocation, and drive business growth.

2. Data Sources

- Source :   Indian Data Portal

- Source Link: https://indiadataportal.com/p/export-trade-statistics

- Timeline: 2021-2025

3. Problem Statement

Export trade data related to Asian countries consists of large volumes of transactional records covering multiple countries, regions, commodities, prices, quantities, and time periods. Due to the complexity and scale of this data, it is difficult to clearly identify export trends, evaluate country-wise and region-wise performance, and understand variations in export value and unit prices.

There is a need to systematically analyze export trade data to identify major export destinations and assess their contribution to overall export performance. Understanding commodity-level exports is also essential to determine which products drive trade growth and which commodities show fluctuating or declining trends.

Additionally, export performance must be compared across different time periods to identify trade growth patterns, seasonal variations, and year-to-date performance. Variations in prices and unit values across countries and commodities further add complexity, making it challenging to assess competitiveness and value realization.

Another key challenge is market concentration risk, where exports may be heavily dependent on a small number of countries or regions. Without proper analysis, this dependency can increase trade risk and limit diversification opportunities.

This project addresses these challenges by cleaning, structuring, and analyzing export trade data using Excel and Power BI. The analysis provides insights into key export trends, major destination markets, commodity-level performance, price and unit value variations, and market concentration, thereby supporting informed decision-making in international trade

4. Attribute (Column /Features) Detail

Attribute Name	Data Type	Description
ID	Integer / String	Unique identifier for each Commodity
Date	Date	Date for each Commodity
Country_Name	String	Name of the Country
Alpha_3Code	String	Alpha-3 codes (e.g., **IND, CHN, USA**) are **alphabetic identifiers**
Country_code	Integer	A unique numeric identifier assigned to each exporting or importing country, used for data linking and analysis.
Region	String	The broader geographical region to which the country belongs (e.g., South Asia, East Asia)
Region_code	Integer	A numeric code representing the geographical region for standardisation and grouping purposes.
Sub_Region	String	A more specific geographical classification within a region (e.g., South-East Asia).
Sub Region_code	Integer	A numeric identifier for the sub-region, enabling hierarchical regional analysis.
Hs_code	Integer	Harmonized System code used to classify traded commodities internationally. It uniquely identifies the product category.

Commodity Name	String	The descriptive name of the exported commodity corresponding to the HS code.
Unit	Integer	The unit of measurement used to record the quantity of the exported commodity (e.g., KG, MT, NOS).
Price	Integer	The price per unit of the exported commodity, usually expressed in a specific currency.
Export_value	Integer	The total monetary value of exports, calculated based on quantity and price. This is a key performance measure.

5. Tools & Technologies

- **Excel:** Data cleaning, transformation, and Pivot Tables.

- **Power BI:** Data modelling, DAX calculations, visualization, and interactive dashboard creation.

6. Data Pre-Processing (Excel / Power Query)

Data pre-processing was performed to ensure accuracy, consistency, and usability of the export trade dataset before analysis and visualization. The following steps were carried out using **Excel and Power Query**:

6.1. Data Cleaning

- Removed duplicate records to avoid double counting of export values.

- Handled missing and blank values in quantity and price columns.

- Removed records with zero quantity where required to maintain meaningful trade analysis.

- Standardized text fields such as country names, regions, and commodity names for consistency.

6.2. Data Type Standardization

- Converted date columns to proper **Date** format.

- Ensured numerical columns such as **Quantity**, **Price_INR**, and **Price_Dollar** were stored as numeric values.

- Verified code columns (Country_Code , Region_Code, Sub_Region_Code) for consistency.

3. Feature Creation

- Calculated **Export Value (INR)** and **Export Value (Dollar)** using quantity and price.

- Derived date-related attributes such as **Year**, **Month**, and **Month Name** for time-based analysis.

- Created **Unit Value** to analyse price variations across regions and commodities.

   4. Fact and Dimension Table Creation

- Split the original dataset into a **Fact table** and multiple **Dimension tables** (Date, Country, Region, Commodity).

- Removed duplicate keys from dimension tables to ensure one-to-many relationships.

- Ensured each dimension table contained unique values only.

7. Data Modelling and DAX (Power BI)

- **Data Model:** Established relationships between tables, defined cardinality, and created lookup tables where necessary.
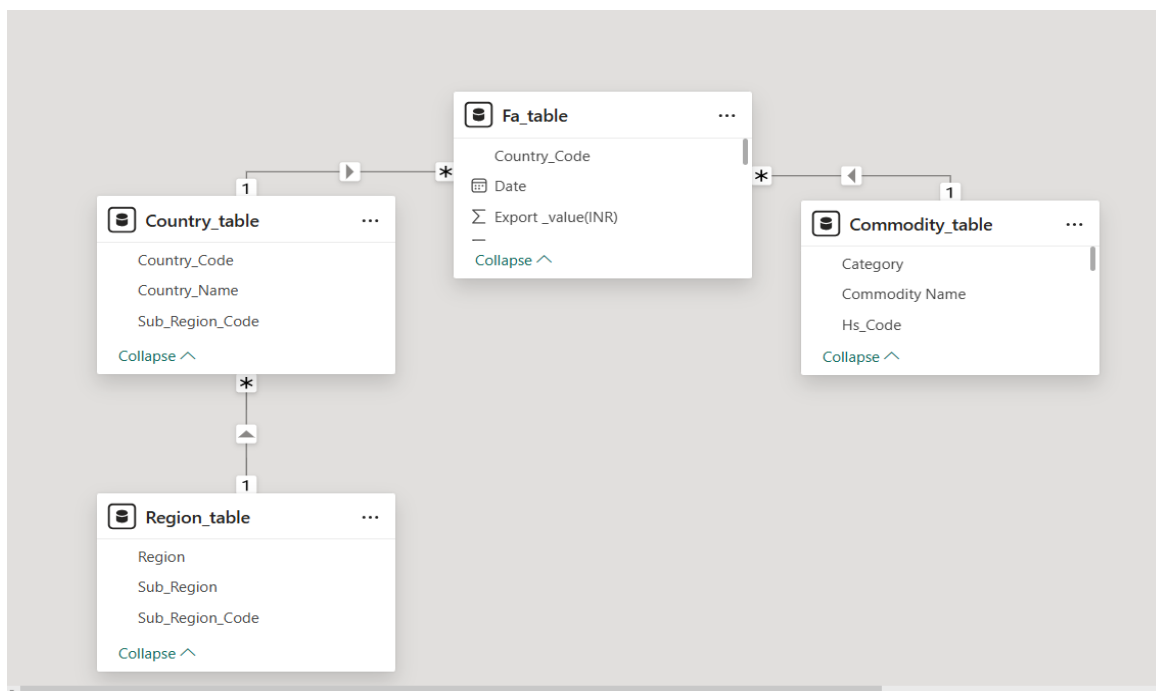
- **Calculated Columns & DAX Measures**
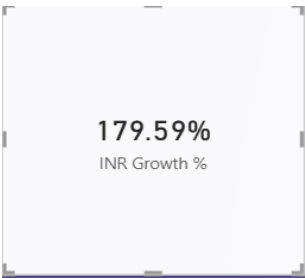
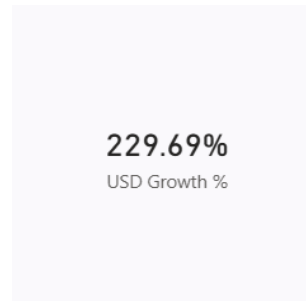 **Total export value and quantity** to Asian countries

  95T
  Total_Export_Value(INR)

  Total export quantity to Asian countries

  243bn
  Total_Quantity_Value
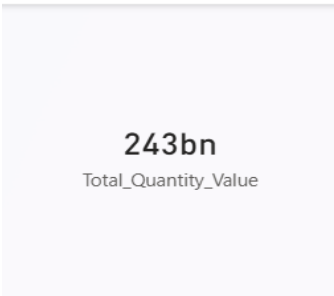
  Total export value to Asian countries in USD

  10T
  Total_Export_Value(USD)

  Overall Export Growth (%) in INR

  179.59%
  INR Growth %

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Overall Export Growth (%) in USD
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229.69%
USD Growth %

Export growth differ when measured in INR versus USD

-50.10%
INR–USD Growth %
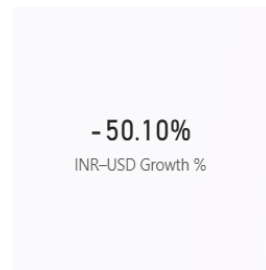
8.Analysis and Visualizations (Power BI)

Dashboard Features:

- Multiple Visualizations based on problem statement: Bar charts, line charts, pie charts, cards, and tables to communicate insights**.**

### Top Asian Export Destinations by Export Value (INR Trillion)

Insights

- **China** is the **largest export destination**, contributing **₹31T**, making it the **top Asian market** for exports.

- **United Arab Emirates (UAE)** ranks **second** with exports worth **₹24T**, highlighting its role as a major trade hub.

- **Singapore** holds the **third position** with **₹11T**, significantly lower than China and UAE but still a key destination.

- **Bangladesh** follows with **₹7T**, indicating strong regional trade within South Asia.

- **Malaysia** contributes **₹4T**, while **Saudi Arabia, Oman, and Republic of Korea** each record exports of around **₹3T**.

- The **top 2 countries (China + UAE)** together account for **₹55T**, which is **over 65% of the total export value** among the listed Asian countries.

## Export Contribution by Asian Sub-Regions (INR Trillion)
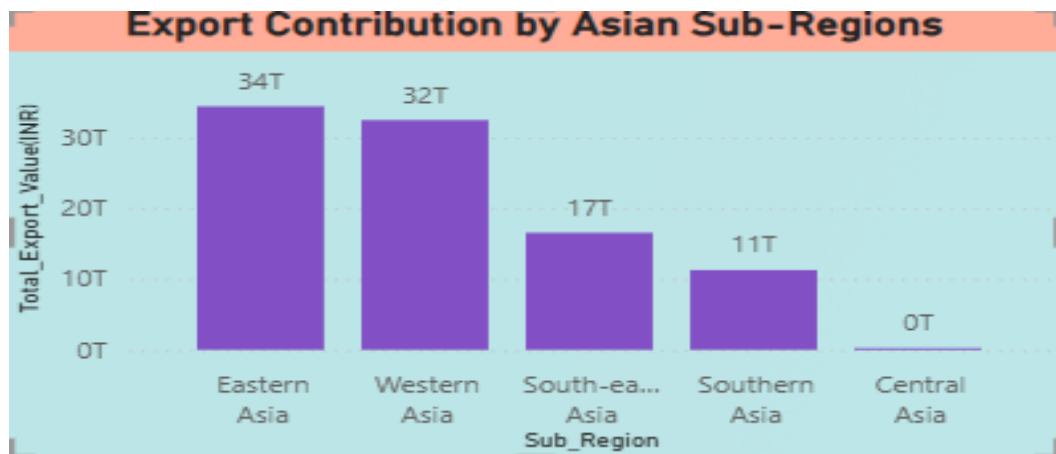
Insights

- Eastern Asia is the largest contributor, with exports worth ₹34T, making it the dominant sub-region.

- Western Asia closely follows at ₹32T, contributing almost the same level as Eastern Asia.

- South-East Asia contributes ₹17T, accounting for roughly 20% of total exports among Asian sub-regions.

- Southern Asia records ₹11T, showing moderate export contribution.

- Central Asia contributes negligible exports (₹0T), indicating minimal trade activity in the dataset.

Top Export Commodities by Export Value (INR Trillion)
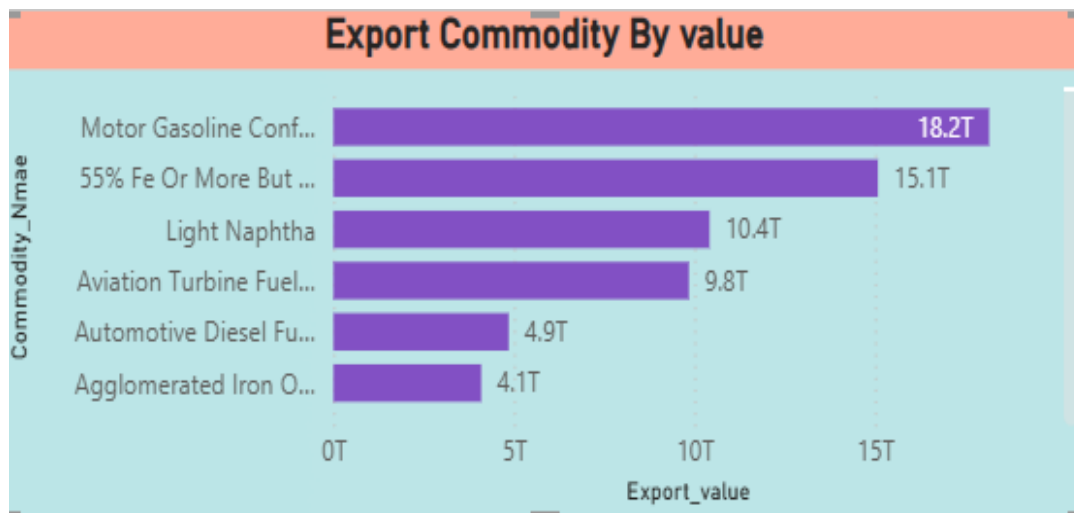
Insight

Energy and mineral-based commodities dominate exports, with Motor Gasoline and Iron Ore together contributing over ₹33T.
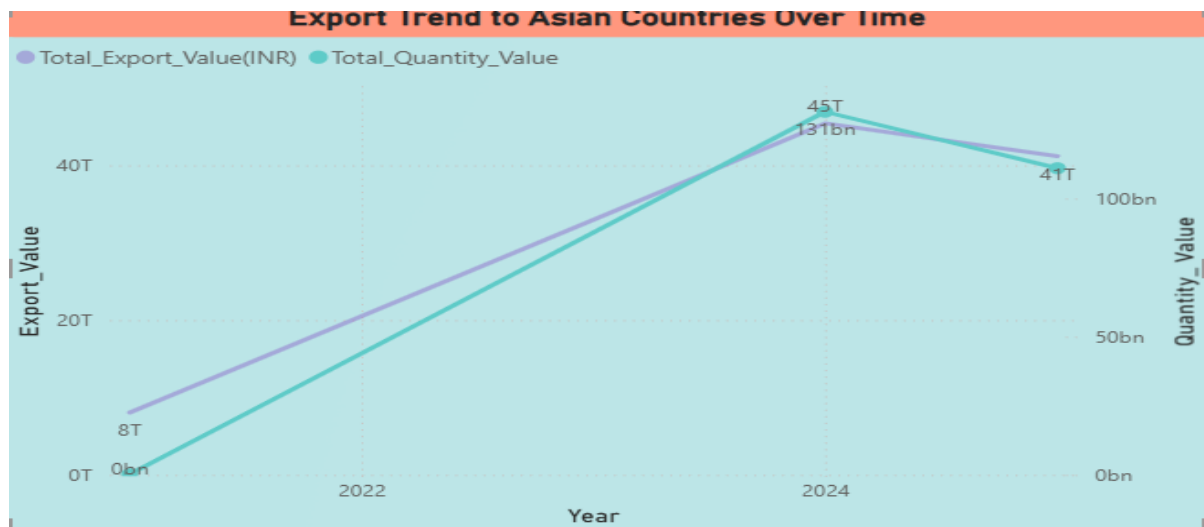
Top Export Commodities by Export Quantity (INR Billion)

Insights

- High-volume commodities are largely low-to-medium value, suggesting price sensitivity and bulk trade dynamics.

- Bulk commodities dominate export quantity, with Other Salts and Iron Ore together accounting for 45 bn units**.**

**Export Growth Trend to Asian Countries (Value vs Quantity)**

Insights

Asian exports experienced rapid growth between 2021 and 2024, driven by both rising volumes and export values, with a mild moderation observed in 2025.

- **Export value increased sharply from ₹8T in 2021 to a peak of ₹45T in 2024**, showing strong trade expansion.

- **Export quantity grew from ~0 bn in 2021 to ~131 bn units in 2024**, indicating volume-led growth.

- **2024 recorded the highest export performance** in both value (₹45T) and quantity (131 bn).

- **A slight decline is observed in 2025**, with export value reducing to **₹41T** and quantity to **~100 bn**, suggesting possible market correction or demand slowdown

- Overall, **exports show a strong long-term upward trend**, despite short-term fluctuations.
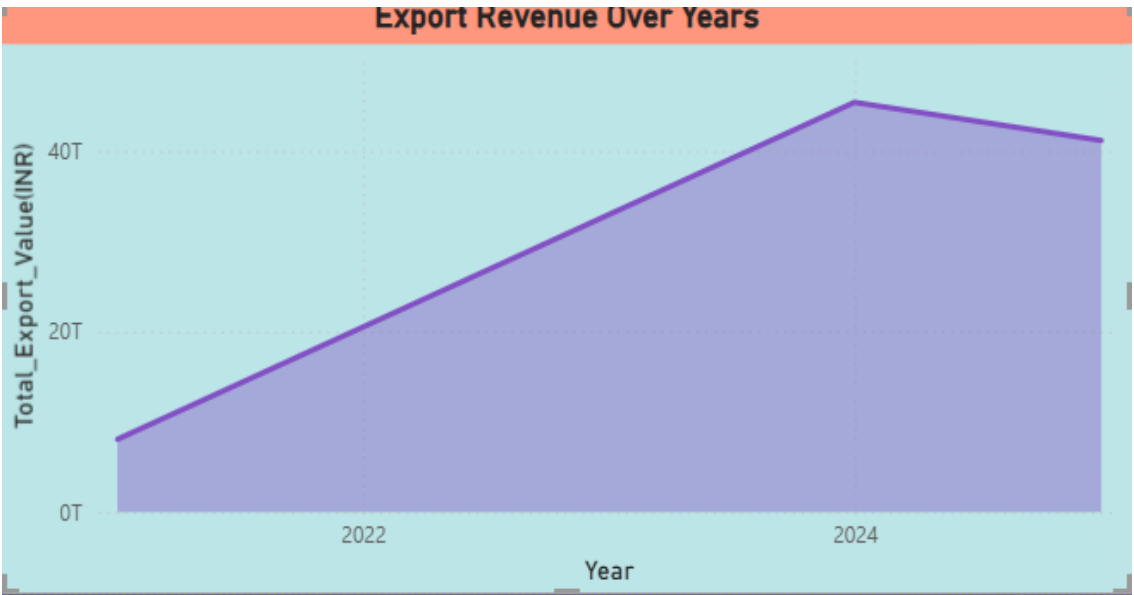
Country-wise Export Growth Trends in Asian Markets (2021–2025)
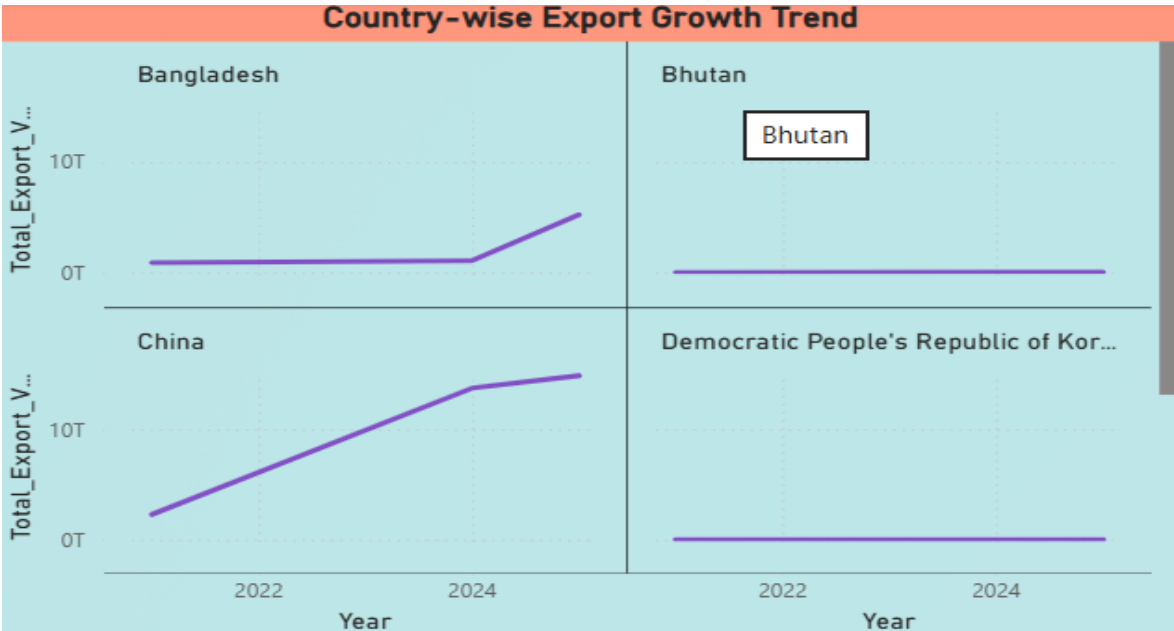
Insights

China dominates country-wise export growth in Asia, while several smaller economies show stagnant or minimal export performance.
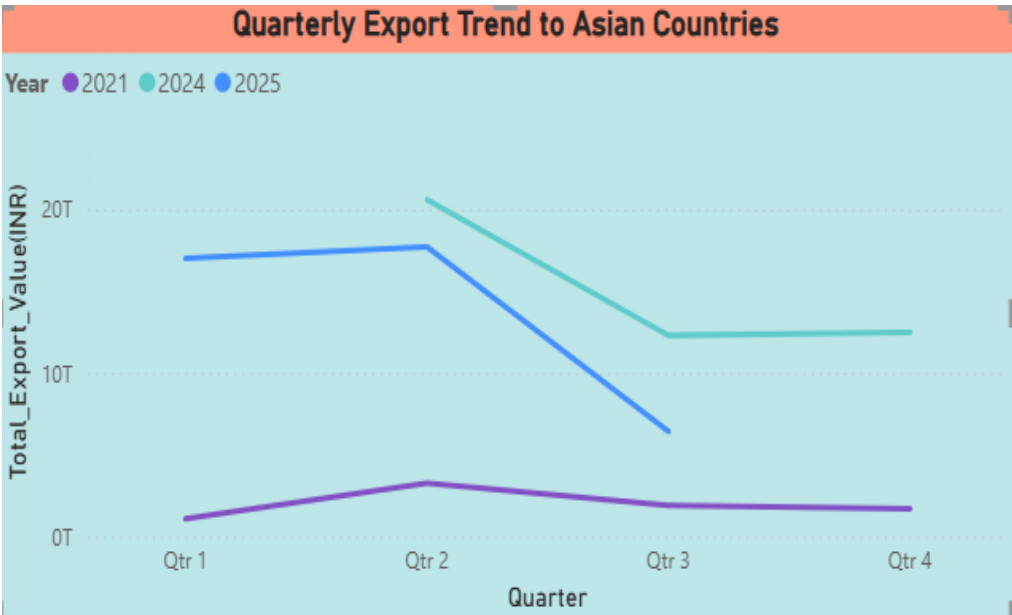
Export Revenue Trend Across Asian Countries (2021–2025)

Insights

Export revenue rose sharply from ~₹8T in 2021 to a peak of ~₹45T in 2024, before a slight decline to ~₹41T in 2025, indicating strong long-term growth with recent moderation.
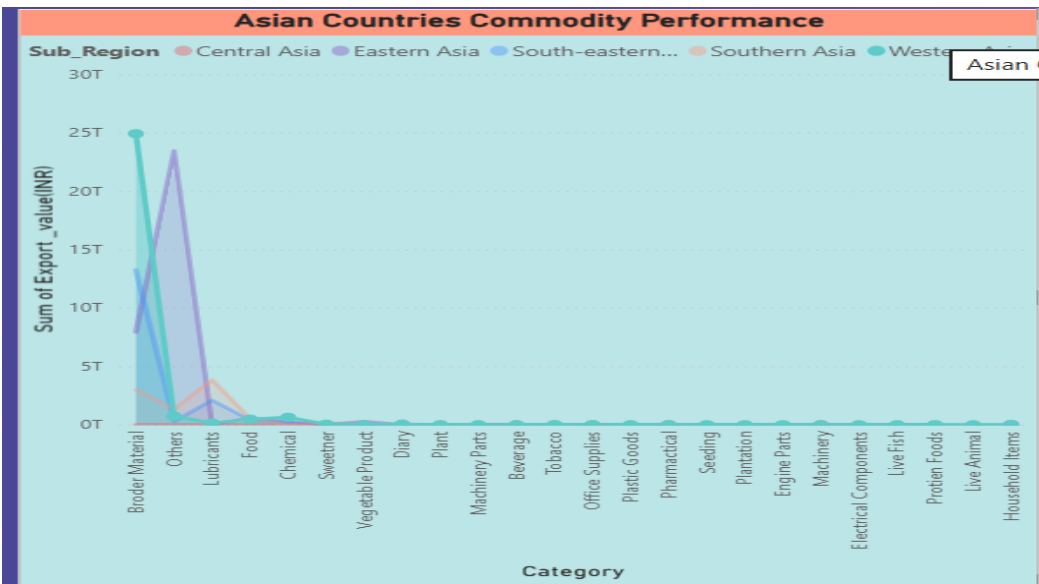
Quarterly Export Performance to Asian Countries (INR)

Insights

Exports peaked in Q2 2024 at ~₹21T, followed by a sharp decline of nearly 40% to ~₹12T in Q3, indicating strong mid-year seasonality and a slowdown in later quarters.
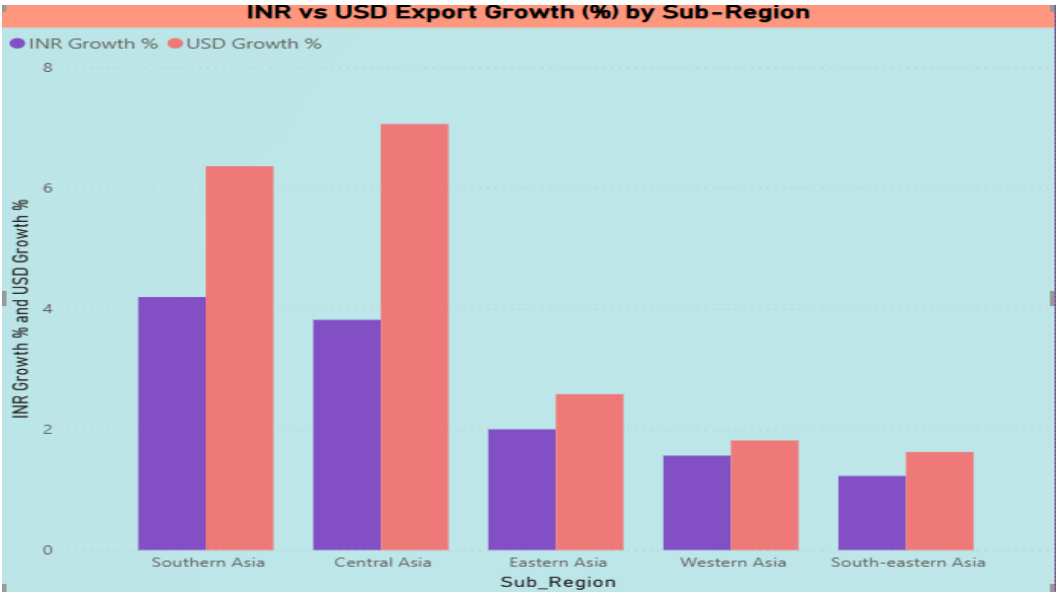
Commodity-wise Export Performance Across Asian Sub-Regions

Insights

Border Material dominates exports, with Western Asia (~25T INR) and Eastern Asia (~23T INR) contributing the highest commodity export values, while most other categories remain below 5T INR across regions.
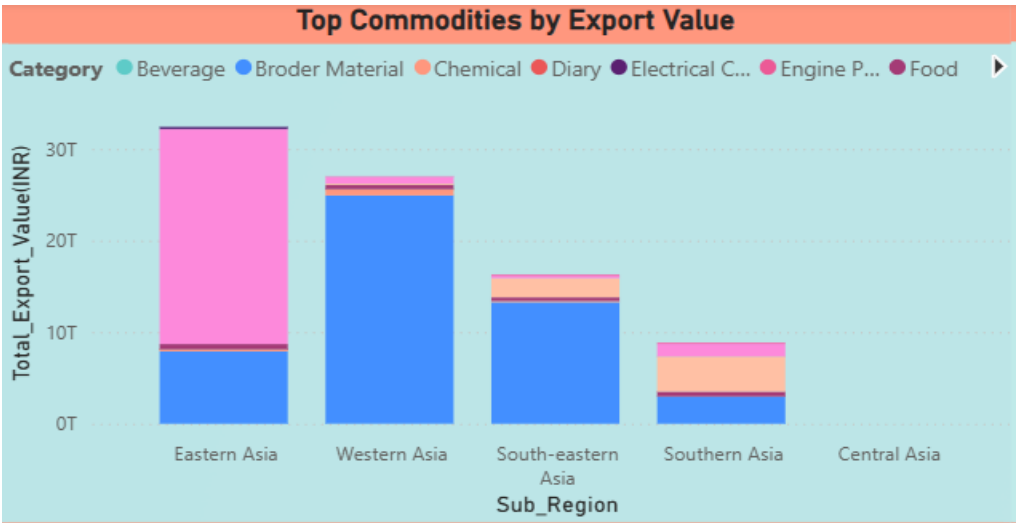
INR vs USD Export Growth Comparison Across Asian Sub-Regions

Insights

USD export growth outperformed INR growth across all Asian sub-regions, with Central Asia showing the highest USD growth (~7%) compared to INR growth (~3.8%), while Southeast Asia recorded the lowest growth in both currencies (~1–1.5%).
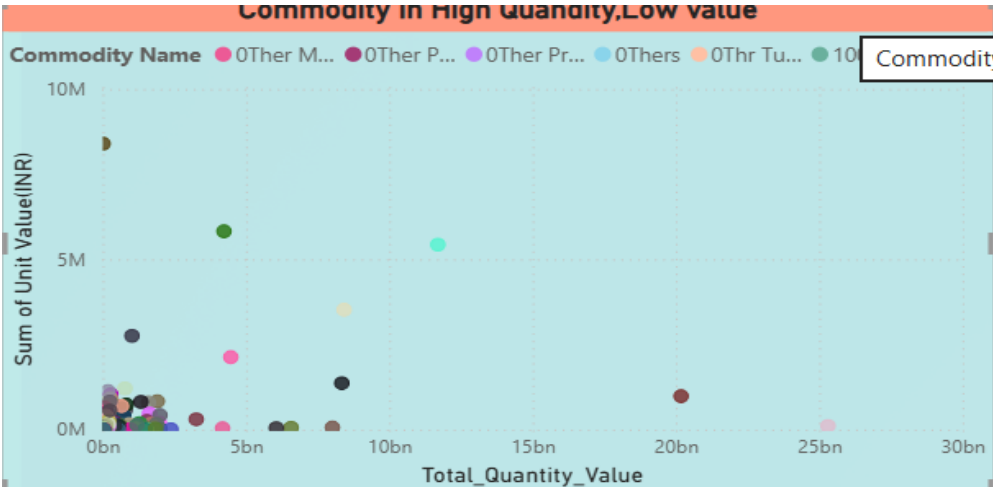
Top Commodity Categories by Export Value Across Asian Sub-Regions

Insights

Eastern Asia leads with ~₹32T export value, driven largely by Food and Broader Material categories, while Central Asia contributes nearly ₹0T, indicating minimal commodity-level exports.
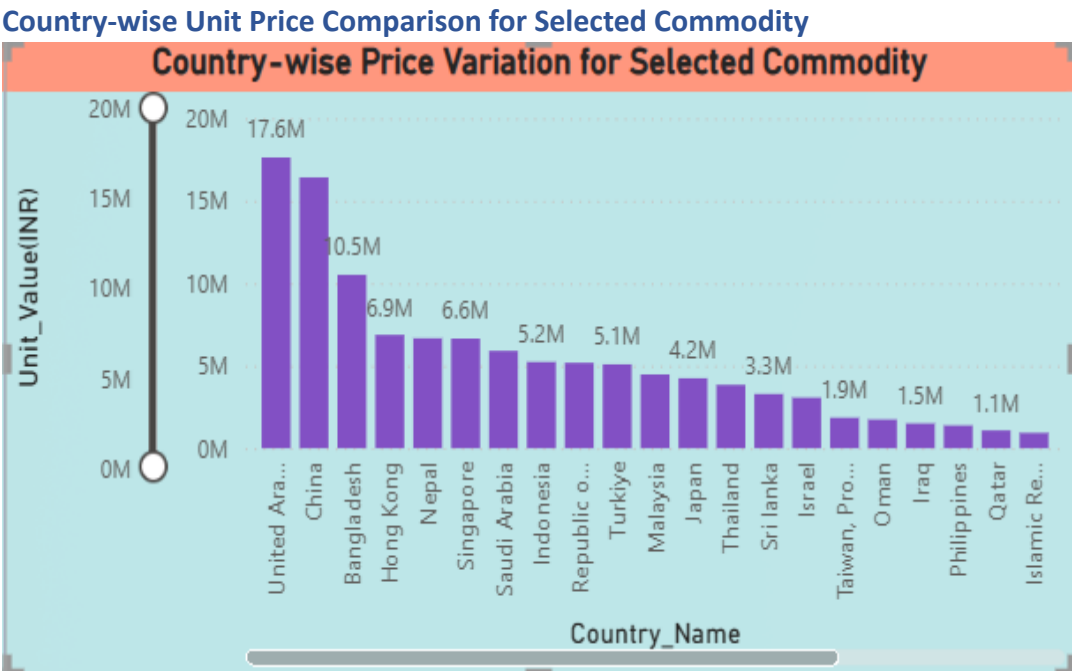
Export Growth Trend of Key Commodities (Monthly)


Export Growth of commodities

Insight

Exports peak at ~₹2T during early 2025, followed by sharp month-to-month volatility with values frequently dropping below ₹0.5T.

Country-wise Unit Price Comparison for Selected Commodity

Insight

The chart shows a significant variation in unit prices for the selected commodity across Asian countries. The United Arab Emirates (~₹17.6M) and China (~₹16M) record the highest unit values, indicating premium pricing, stronger demand, or higher value-added exports in these markets. In contrast, most other countries such as Bangladesh, Hong Kong, Nepal, and Singapore fall within the ₹5–7M range, while countries like Qatar, Philippines, and Iraq exhibit the lowest unit prices (around ₹1–2M). This wide price dispersion highlights differences in market maturity, purchasing power, trade agreements, and product quality across countries, suggesting opportunities for exporters to optimize pricing strategies by targeting high-value markets.
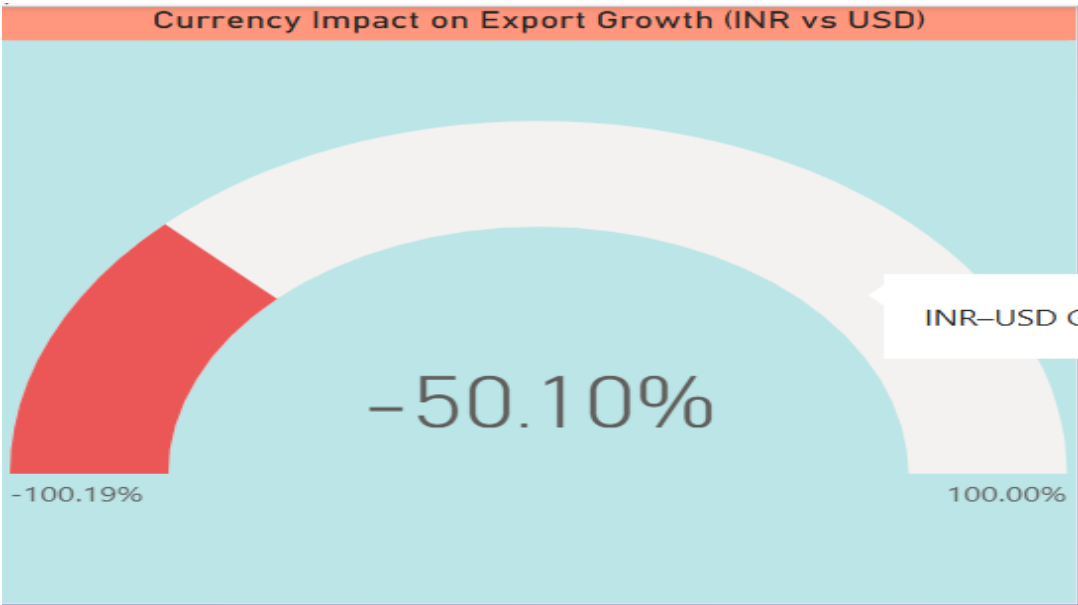
Asian Sub-Region Export Growth Comparison: INR vs USD
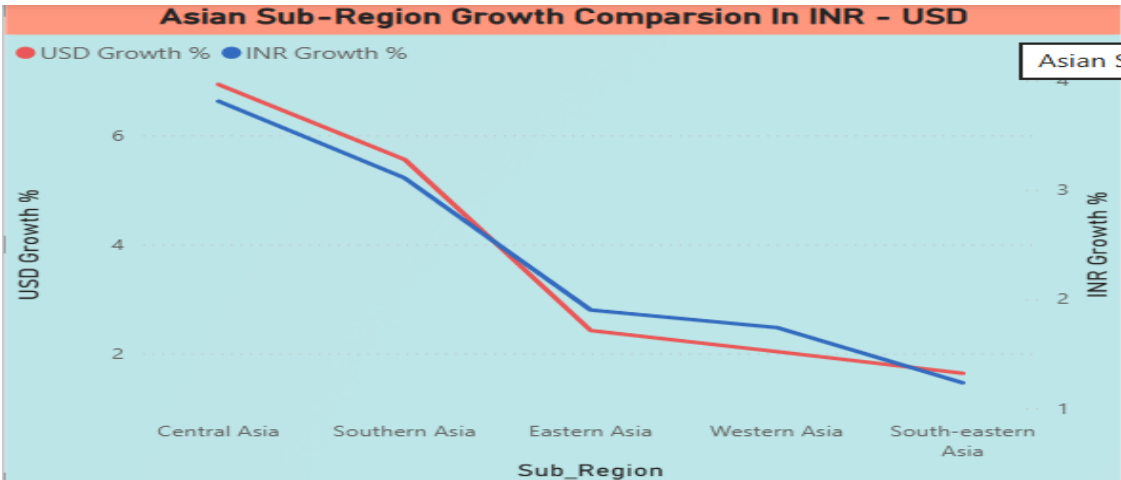
Insight

Central Asia shows the highest export growth (USD ≈ 7%, INR ≈ 6.5%), while South-eastern Asia records the lowest growth (USD ≈ 1.6%, INR ≈ 1.4%), indicating a declining growth trend from Central to South-eastern Asia.
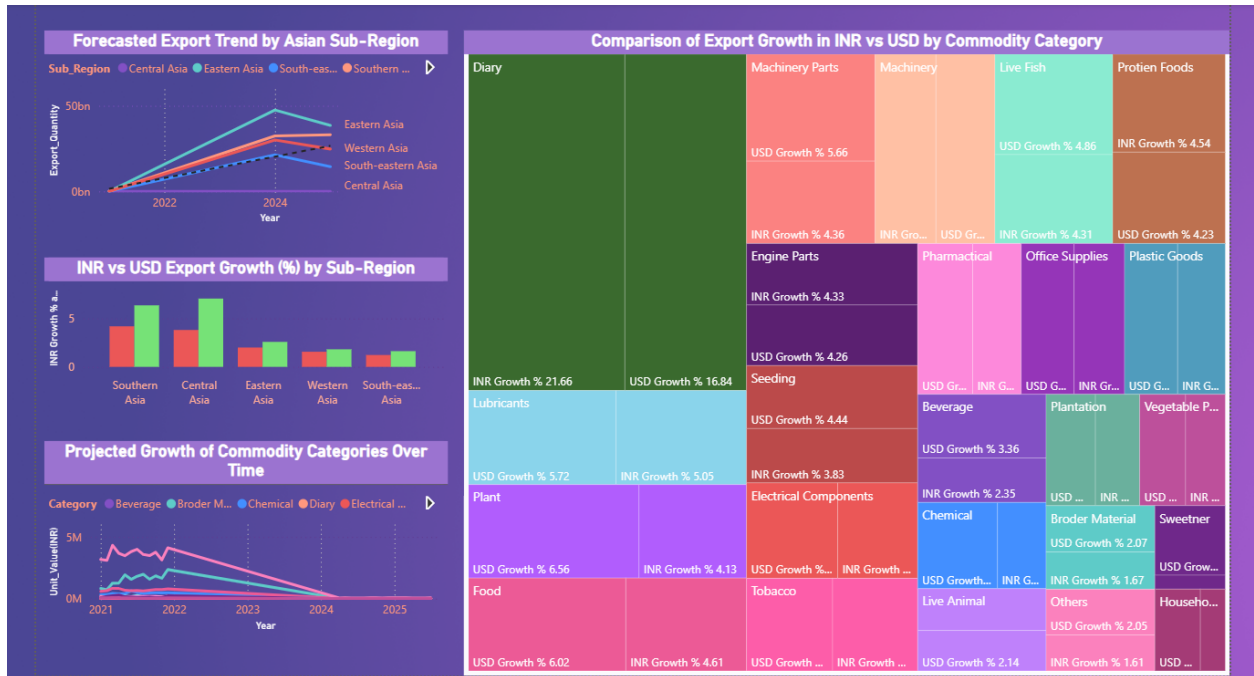
Currency Impact on Export Growth (INR vs USD)

Insight

Exports show a −50.10% INR–USD growth gap, indicating a significant negative impact of currency fluctuations on overall export performance.

Dashboard

9. Insights & Key Finding

Key Findings – Asian Export Trade Analysis

Summary of Trends

- Asian export trade shows strong long-term growth, with total exports reaching USD 10T and INR 95T during the analysis period.

- Eastern Asia and Western Asia dominate exports, together contributing over 70% of total export value, making them the primary growth drivers.

- China remains the top export destination (₹31T), followed by UAE (₹24T) and Singapore (₹11T), indicating a high concentration of exports among a few key markets.

- Export performance peaked in 2024 (₹45T), followed by a slight decline in 2025, suggesting market stabilization after rapid growth.

- Quarter 2 consistently records the highest exports, while Quarter 3 and Quarter 4 show slower performance, highlighting seasonality in trade.

- INR export growth (179.59%) is strong, but the negative INR–USD growth (−50.10%) indicates the impact of currency depreciation on real export gains.

- USD growth (229.69%) exceeds INR growth, suggesting better value realization in dollar-based exports.

- Several commodities show high export volumes but low unit prices, indicating pressure on margins despite large quantities.

- Significant country-wise price variation reflects differences in demand, quality, and market maturity across Asian countries.

- Forecast analysis shows Eastern Asia continuing to lead future export growth, while Central and South-East Asia grow at a slower pace.

Key Patterns

- **Export concentration pattern:** A small number of regions and countries account for most exports, with **Eastern and Western Asia contributing the majority of total export value**.

- **Market dominance pattern: China and the UAE consistently dominate export destinations**, indicating dependency on a few high-volume markets.

- **Growth–currency divergence pattern:** While **INR export growth is high (179.59%)**, the **negative INR–USD growth (−50.10%)** shows currency depreciation reducing real growth benefits.

- **Price variation pattern: Wide country-wise price differences** highlight varying quality standards, transportation costs, and purchasing power.

- **Forecast trend pattern:** Future projections indicate **continued dominance of leading regions**, with moderate growth expected rather than rapid expansion.

Export Trade Analysis – Insights

Descriptive Analysis

- Total export value reached ₹95T (INR) and $10T (USD) during the analysis period.
- Eastern Asia (₹34T) and Western Asia (₹32T) together contribute over 70% of total exports.
- China (₹31T) and UAE (₹24T) are the top export destinations.
- Export growth in INR (179.59%) is significantly higher than USD growth, indicating strong nominal growth.
- Key commodities such as petroleum products, chemicals, and machinery dominate export value.
- Quarter 2 consistently records peak exports, while Quarter 3 and 4 show moderation.

Diagnostic Analysis

- High INR growth vs lower USD growth is mainly due to INR depreciation, reducing gains when converted to USD.
- Export concentration in a few countries suggests limited market diversification.
- High-quantity, low-value commodities indicate reliance on volume rather than pricing power.
- Seasonal demand cycles drive Q2 export peaks (industrial demand, energy, agriculture).
- Price variation across countries reflects differences in quality, logistics costs, and trade agreements.
- Lower contribution from Central Asia is linked to limited trade infrastructure and demand.

Predictive Analysis

- Eastern and Western Asia will remain dominant, but growth rates may stabilize.
- USD-based growth may remain volatile if currency depreciation continues.
- High-volume commodities will continue driving exports, unless value addition improves.
- Quarterly seasonality is expected to persist, with Q2 remaining the strongest.
- Emerging Asian markets may show gradual growth but will not overtake top destinations soon.

Prescriptive Analysis

- Diversify export markets to reduce dependence on China and UAE.
- Increase value-added exports (processed goods, high-tech products) to improve USD returns.
- Adopt currency hedging strategies to protect against INR–USD volatility.
- Strengthen trade ties with underperforming regions like Central and South-East Asia.
- Focus on premium pricing strategies instead of only increasing export volume.
- Plan production and logistics around seasonal peaks to maximize profitability.

Conclusion

The analysis reveals **strong export growth driven by volume and regional concentration**, but **currency impact and limited diversification pose risks**. Strategic focus on **value addition, market expansion, and currency management** is essential for sustainable export growth.