E-commerce Growth Analysis (COMP3125 Individual Project)

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Abstract

Over the past few years, e-commerce has expanded quickly, altering how consumers browse and engage with brick-and-mortar stores. This project analyzes how e-commerce is growing as a percentage of total retail, looks at the rise of worldwide e-commerce sales, and determines which regions are driving this increase. This research uses Statista data to highlight important trends and insights about the future direction of e-commerce and the elements that make it successful.

Keywords:

- E-commerce

- Retail growth

- Global trends

- Market analysis

I. INTRODUCTION

Thanks to the internet, new technology, and changes in consumer behavior, e-commerce has revolutionized the way people purchase in recent years. The global adoption of e-commerce was also significantly accelerated by the COVID-19 epidemic. This study looks at how e-commerce has expanded around the world, which nations and areas are driving this trend, and what the data indicates about its prospects.

Key Research Questions:

1. How have global e-commerce sales grown in the last five years?

2. What percentage of total retail sales does e-commerce represent worldwide, and how has this share evolved?

3. Which countries have shown the highest revenue growth in e-commerce over the past few years?

The findings provide stakeholders with insights into the dynamics of the e-commerce market, offering opportunities for future growth.

II. Datasets

A. Sources of Data

1. Worldwide Retail E-Commerce Sales
   Source: Statista
   Description: Global sales data tracking the growth of e-commerce over time.

2. E-Commerce Share of Retail Sales Worldwide
   Source: Statista
   Description: Data showing e-commerce's share of total retail sales globally.

3. Revenue Growth in E-Commerce for Selected Countries
   Source: Statista
   Description: Regional and country-specific revenue growth trends for e-commerce.

B. Characteristics of the Dataset

- Format: Tabular datasets (.csv) containing annual sales, percentages, and revenue growth metrics.

- Features:

  - Year (time series)

  - Global sales ($ billions)

  - Share of total retail (%)

  - Country/Region-specific revenue growth (%)

- Preparation:

  - Data Cleaning: Handling missing values and standardizing units.

  - Feature Engineering: Calculating yearly growth rates and aggregating regional data.

III. Methodology

Tools and Techniques

- **Python Libraries**:
    - **Pandas** for data manipulation.
    - **Matplotlib and Seaborn** for visualizations.
- **Calculations**:
    - Year-over-year growth rates.
    - Regional comparisons for e-commerce penetration.
- **Models**:
    - Time series forecasting with Prophet to predict future trends.
    - Clustering using K-Means to group countries based on growth and adoption rates.

IV. Results

A. Global E-Commerce Sales (2017–2027)

- Observation:
  From $1.5 trillion in 2015 to an estimated $8 trillion by 2027, e-commerce revenues have increased steadily. This illustrates the sector's explosive growth, since it represents a five-fold increase over 12 years.

B. E-Commerce as a Percentage of Total Retail Sales (2021–2027)

- Observation:
  E-commerce's percentage share of overall retail sales increased from 18.8% in 2021 to a predicted 22.6% by 2027, demonstrating the growing global adoption of online sales in the retail industry.

C. Leading Countries in Retail E-Commerce Growth (2023)

- Key Insights:
    - Mexico leads with a growth rate of 25.1%, followed by the Philippines (24.1%) and Malaysia (18%).

- Significant increase is seen in emerging markets such as Argentina, Brazil, and India, indicating unrealized potential in these areas.

- Despite attaining growth of 11.4%, China's market is maturing in contrast to its previous double-digit expansion rates.

Visualizations

1. Global E-Commerce Sales Trend (2017–2027)

   - Line graph depicting sales growth from 2017 to 2027.

   - Trend shows consistent year-over-year growth, with marked acceleration post-2020 due to pandemic-driven digital adoption.
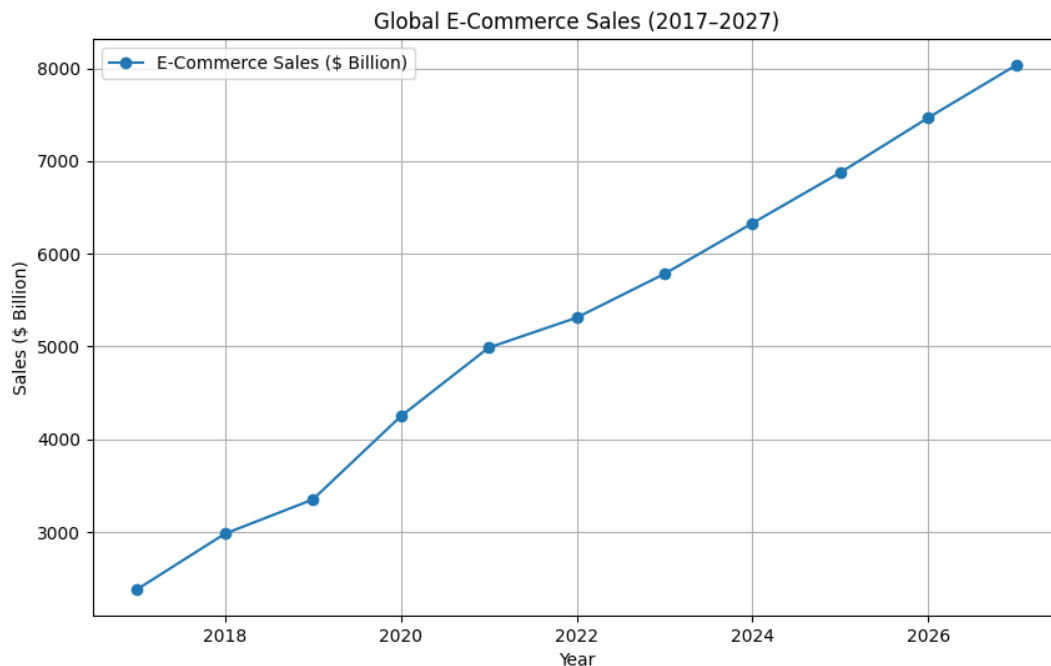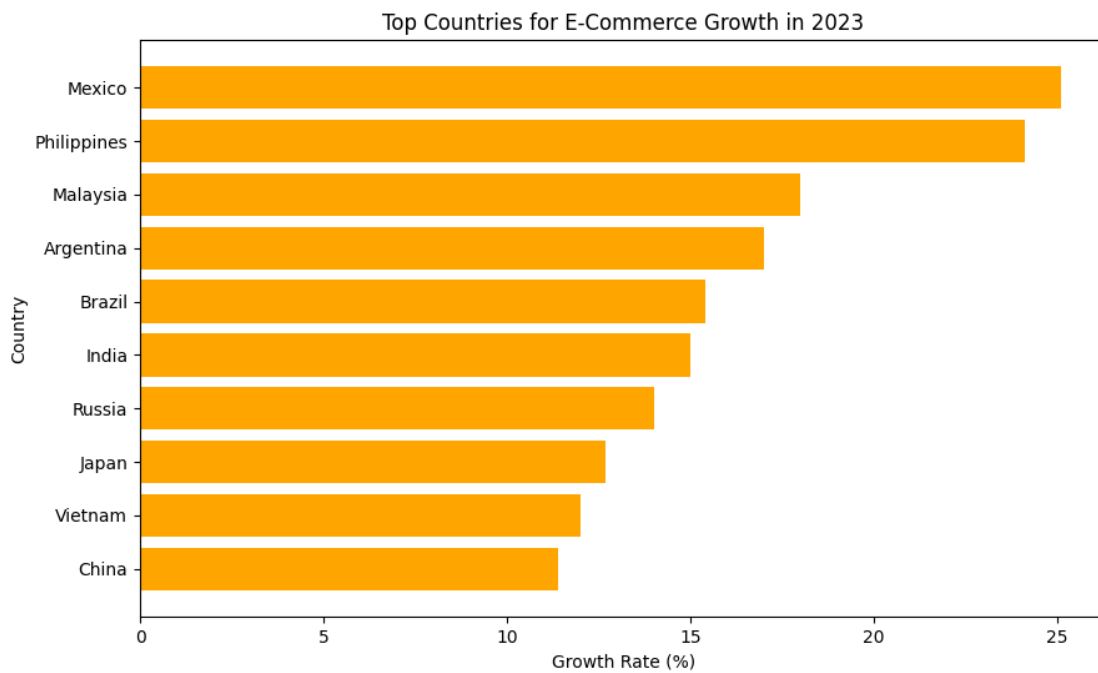

2. E-Commerce Share of Retail Sales (2021–2027)

   - Bar chart showcasing the rise in e-commerce as a percentage of total retail sales, emphasizing the increasing role of online channels.

E-Commerce as Percentage of Total Retail Sales (2021–2027)
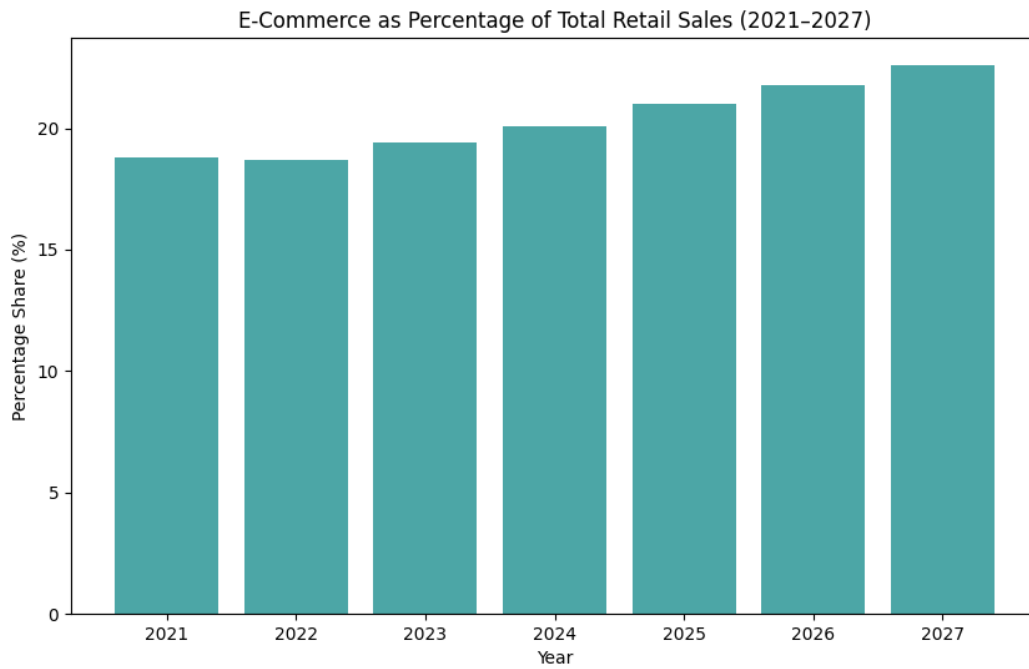
3. Top 10 Countries for E-Commerce Growth in 2023

- Horizontal bar chart comparing growth rates for leading countries, highlighting regional dynamics and growth leaders.

Top Countries for E-Commerce Growth in 2023

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