A STUDY OF THE MOVEMENT OF THE GROWTH OF CIVIL AVIATION IN FRANCE WITH ITS ECONOMIC DEVLOPMENT INDICATORS

Dissertation submitted to The Mahatma Gandhi University

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Bachelor of Commerce

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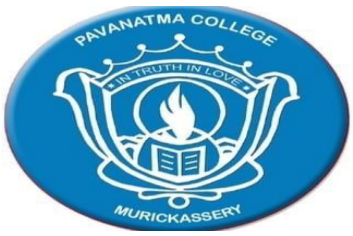

RESEARCH &P. G DEPARTMENT OF COMMERCE

PAVANATMA COLLEGE

MURICKASSERY

(Affiliated to M G University, Kottayam)

NAAC Re-accredited 'A' Grade College

2020-23

DECLARATION

We hereby declare that the project entitled is **"A STUDY OF THE MOVEMENT OF THE GROWTH OF CIVIL AVIATION IN FRANCE WITH ITS ECONOMIC DEVELOPMENT INDICATORS"** a bonafide piece of research work done under the supervision and guidance of **Mr.BOBY THOMAS,** Department of Commerce, Pavanatma College, Murickassery and is submitted to the Mahatma Gandhi University for the partial fulfilment of degree of Bachelor Commerce and that it has not been submitted earlier for the award of any degree, Diploma , Fellowship or any other similar title.

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CERTIFICATE

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CHAPTER – 1

INTRODUCTION

1.1 Introduction

Aviation is one of the most “global” industries: connecting people, cultures, and businesses across continents. Colleagues throughout the sector are committed to raising awareness of aviation’s benefits and role. All stakeholders and partners must work together to maximize the benefits of air transport and support aviation’s sustainable growth by connecting more people and places more often. Aviation provides the only rapid worldwide transportation network, which makes it essential for global business. It generates economic growth, creates jobs, and facilitates international trade and tourism. According to recent estimates by the cross-industry Air Transport Action Group (ATAG), the total economic impact (direct, indirect, induced, and tourism-connected) of the global aviation industry reached USD2.7 trillion, some 3.5 percent of the world’s gross domestic product (GDP) in 2014. The air transport industry also supported a total of 62.7 million jobs globally. It provided 9.9 million direct jobs. Airlines, air navigation service providers, and airports directly employed over three million people (Aeroaviation, 2009). The civil aerospace sector (the manufacture of aircraft, systems, and engines) employed 1.1 million people. A further 5.5 million worked in other on-airport positions. 52.8 million indirect, induced, and tourism-related jobs were supported by aviation (Aeroaviation, 2023).

These estimates do not include other economic benefits of aviation, such as the jobs or economic activity that occur when companies or industries exist because air travel makes them possible, the intrinsic value that the speed and connectivity of air travel providers, or domestic tourism and trade. Including these would increase employment and global economic impact numbers several-fold. One of the industries that rely most

heavily on aviation is tourism. By facilitating tourism, air transport helps generate economic growth and alleviate poverty. Currently, approximately 1.2 billion tourists are crossing borders every year, over half of whom travel to their destinations by air. In 2014, aviation supported over 36 million jobs within the tourism sector, contributing roughly USD892 billion a year to global GDP (ICAO, 2018).

1.2 Statement of the problem

The study of the growth of civil aviation is integrated with the economic development of any nation. The economic development indicator is related to the industrial growth of the country. The civil aviation industry is one of the major industries of a country. So there is a possibility of a relationship between a country's GDP and its Air Aviation growth. France is one of the most important wealth structures in the European Union. World. The World Bank has included France in the high-income group of Europe and Central Asia. So the relationship between France's GDP and France's GNI and Air Passenger Transport is significant. Therefor the present study is titled **"A Study of the Movement of the Growth of Civil Aviation in France with Its Economic Development Indicators".**

1.3 Objectives of the study

1. To examine whether the growth of the civil aviation industry of France is correlated with the GDP growth of that nation.
2. To examine whether the growth of the civil aviation industry of France is correlated with the GNI growth of that nation.

1.4 Data collection

The researcher used secondary data collected from the published record of the world bank (Bank, 2022). We used data for 60 years from 1960 to 2020. The data relating to GDP, the data relating to GDP per capita, and the development indicators related to the airline industry of France were collected and used for analysis.

1.5 Tools of Analysis

Time series trend projection and correlation analysis are used for analysis.

1.6 Period of Study

We used the data from 1960 to 2020.

1.7 Hypothesis

$H_0$1 The Growth of the Airline industry of France is not correlated with the growth of its GDP.

$H_1$1 The Growth of the Airline industry in France is correlated with the growth of its GDP.

$H_0$2 The Growth of the Airline industry in France is not correlated with the growth of its GNI.

$H_1$2 The Growth of the Airline industry in France is correlated with the growth of its GNI.

1.8 Chapter Scheme

The presentation report is divided into four chapters. Airline industry of France the growth of its GDP, GNP, Air Passenger traffic, and Air Cargo.

Chapter 1 - Introduction

This introduction chapter deals with a topic like the Introduction of the airline industry, the Objective of the study, Statement of the problem, Data collection, Tools of analysis, Period of study, Hypothesis, and Chapter Scheme.

Chapter 2 – Civil Aviation Industry of France – Literature Review

Airline industry of France Literature Review; includes the current situation in France, the Airline Industry and Economic Development, the Airline Industry vs Tourism Industry, the Importance of Economic Growth, civil Aviation Impacts, and Theoretical Framework.

Chapter 3 – Data Analysis

Introduction of data analysis, nature of data, summary statistics. Data Analysis has mainly two parts: Trend Analysis, Correlation Analysis. Trend analysis and correlation analysis are carried out in the following dimensions:

1. Growth trend of Air Passenger Transport and GDP
2. Growth trend of Air Passenger Transport and GNI
3. Growth trend of GDP and GNI

Chapter 4 – Findings, Conclusions, Suggestions

The chapter deals with introduction, findings, suggestions and conclusion about the relationship between the economic indicators of a country and the industrial growth of that country.

References

Aeroaviation. (2009). *History of Aviation*. Aeroaviation.Org. https://doi.org/10.1007/978-1-4020-8664-9_1

Aeroaviation. (2023). *About Aero Aviation*. Https://Aeroaviation.Org/.

Bank, W. (2022). *GDP (current US $) - France*. The World Bank.

ICAO. (2018). Aviation Benefits: contributing to global economic prosperity. *Uniting Aviation*, 1–2. https://www.unitingaviation.com/news/economic-development/aviation-benefits-for-a-better-future/

Chapter 2

Civil Aviation Industry of France- Literature Review

2.1 Introduction

The airline industry encompasses a wide range of businesses, called airlines, which offer air transport services for paying customers or business partners. These air transport services are provided for both human travellers and cargo and are most commonly offered via jets, although some airlines also use helicopters. It generates economic growth, creates jobs, and facilitates international trade and tourism. An airline is a company that provides air transport services for traveling passengers and freight. Airlines use aircraft to supply these services and may form partnerships or alliances with other airlines for codeshare agreements, in which they both offer and operate the same flight. The international airline industry provides service to virtually every corner of the globe and has been an integral part of the creation of a global economy. The airline industry itself is a major economic force, both in terms of its operations and its impacts on related industries such as aircraft manufacturing and tourism, to name but two. Few other industries generate the amount and intensity of attention given to airlines, not only among its participants but from government policymakers, the media, and almost anyone who has an anecdote about a particular air travel experience.

Civil aviation means flights and aircraft as transporting goods or passengers, rather than for military purposes: The government wants to put civilians in charge of civil aviation and bring in private firms to run the airports. Aviation provides the only rapid worldwide transportation network, which makes it essential for global business. It generates economic growth, creates jobs, and facilitates international trade and tourism. The aviation industry is the business sector dedicated to manufacturing and operating all types of aircraft. Air traffic controllers, when they are awake, are concerned with aviation safety. Definitions of aviation. The art of operating aircraft. Synonyms: airmanship. ICAO's aims and objectives, as stated in the Chicago Convention, are to foster

the planning and development of international air transport to ensure the safe and orderly growth of international civil aviation throughout the world; encourage the arts of aircraft design and operation for peaceful purposes.

2.2 Types of airlines

Types of civil aviation airlines include mainly two types: Scheduled and Non-scheduled. Based on travel boundaries they are classified as International and Domestic.

1. Scheduled

The airline company schedules regular flights in and out of an airport, which is usually a busy commercial airport. Scheduled air transportation is accomplished by scheduling flights at regular times and days of the year consistently. The airline responsible for the transportation often has a commercial or operational license and is governed by rules in the Federal Aviation Regulations manual (FAR) and is subject to the capacity.

2. Non scheduled

A non-scheduled airline is a company that offers unscheduled air transport services of passengers or goods at an hourly or per mile/kilometre charge for chartering the entire aircraft along with the crew. A non-scheduled airline may hold domestic or international licenses, or both, and operates under the regulations prescribed by its national civil aviation authority.

3. International

International airlines are a group of the largest, most high-profile, and most successful airlines. They make billions in revenue each year and operate large passenger jets. These airlines also tend to focus their efforts on offering global services, carrying passengers and cargo over large distances.

4. Domestic

Domestic flights are generally cheaper and shorter than most international flights. Some international flights may be cheaper than domestic ones due to the short distance between the pair of cities in different countries, and also because domestic flights might, in smaller countries, mainly be used by high-paying business travellers, while leisure travellers use road or rail domestically.

2.3 Civil Aviation in France

Aviation in France dates back to the early 1900s the country's first flight was recorded by Louis Bleriot in 1909 (Janus, 2009). There were approximately 478 airports in France as of 2020. (Musser & Alpert, 2000)

Airports in France

There are different types of Airports. Following are the classification of Airports in France

Commercial – primary-32
Commercial – non-primary-35
General aviation-401
Military and other airports-38

Among the airspace governance authorities active in France, one is Airports de Paris, which has authority over the Paris region, managing 14 airports including the two busiest in France, Charles de Gaulle Airport and Only Airport. The former, located in Roissy near Paris, is the fifth busiest airport in the world with 60 million passenger movements in 2008, and France's primary international airport, serving over 100 airlines. The national carrier of France is Air France, a full-service global airline that flies to 20 domestic destinations and 150 international destinations in 83 countries (including Overseas departments and territories of France) across all 6 major continents. France is home to aerospace giant Airbus, which has its headquarters and main facilities located in Toulouse. The company has delivered over 10,000 commercial aircraft with the ten thousand being delivered on 14 October 2016 to

Singapore Airlines; it was an Airbus A350. In 2016 the manufacturer's global fleet had performed more than 110 million flights over 215 billion kilometres, carrying 12 billion passengers. Airbus's planes fly for hundreds of active airlines, governments, and private owners all over the world. There is an operator on every continent and nearly every country. (Gaulle, 2008)

2.4 Airline industry and economic development

According to the empirical results, the national income per capita and industrial production index have a positive impact on aviation demand, while ticket prices, inflation, and exchange rates hurt it. The income per capita, ticket prices, industrial production index, inflation, and exchange rate have been accepted as the factors affecting aviation demand. Reduced ticket prices have led to a significant increase in demand for air transport, as a result, the increased demand expanded the airline network globally, and it has facilitated contact with foreign markets these factors give distinguishing data about the economic performance of countries, their level of industrial development and their volume of international trade. It generates economic growth, creates jobs, and facilitates international trade and tourism.

2.5 Airline industry V.S Tourism industry

Tourism and the Airline industry complement each other. Tourism depends on transportation to bring visitors, while the airline industry depends on tourism to generate demand for its services. The growth in the tourism industry directly reflects on airlines. Over the last 25 years, the number of international tourists has more than doubled. The expansion of international tourism has a large impact on the discipline of transport geography.

2.6 Importance of Economic Growth

Gerassimos find significant evidence of convergence in unit costs excluding fuel and transport-related expenses, and labour unit cost in particular. While network legacy

carriers have improved cost efficiency through dramatic labour cost reductions and longer stage length flying, low-cost carriers' labour unit costs continue to increase as these former new entrant airlines mature (Tsoukalas et al., 2008).

Charles K. Ng and Paul Seabright used data from the airline industry to examine the extent to which the costs of airline operations are affected by rents accruing to workers, and the extent to which these rents depend inter alia upon the degree of competition in the industry (Ng & Seabright, 2001).

2.7 Civil Aviation Impacts

Dube examines potential recovery pathways from the global aviation industry following the severe negative impacts of the COVID-19 pandemic. The study found that the pandemic inflicted a heavy toll on global aviation, which resulted in rating downgrades, liquidation, and bankruptcy of several airlines and airports due to severe cash burn instigated by travel restrictions. Although the industry is opening up, the recovery process seems much slower than anticipated. The study recommends that as the sector opens up, it does so in a responsible manner, which puts measures that protect travel, reduce costs, increase efficiency, and ensure a quality customer experience anchored on employees' health and customer safety. Recovery should also occur with the view to building back better in line with the provisions of the Sendai Framework for Disaster Risk Reduction at the same time (Dube et al., 2021).

Dursun research paper is to determine the long-run linkage among variables and the impact of civil aviation, energy productivity (efficiency), and economic growth (GDP), on ecological footprint by conducting the multivariate regression method, from 1970 to 2020. According to the results of the multivariate regression method, civil aviation, energy efficiency, and economic growth affect the ecological footprint from 1970 to 2020. (Dursun, 2022)

2.8 Theoretical Framework

Air transport is a key enabler of economic activity in France, supporting 1.1 million jobs and EUR 100.1 billion to the French economy, which is equivalent to 4.2% of the French GDP (2017). France has the 4th largest aviation market in Europe (measured

by the IATA Connectivity Index1). Air connectivity grew by 33% between 2013 and 2018. In 2017, 89m passengers departed from French airports. The Air Transport Regulatory Competitiveness Indicators (ATRCI) is a framework that measures a country's air transport regulatory competitiveness. Air transport regulatory competitiveness is defined as the set of institutions, policies, and factors that determine the economic benefits that the economy can derive from aviation. (IATA, 2016)

This study examines the contribution of agriculture, industry, and services sectors to economic growth in Bangladesh by using time series data from 1980 to 2013. Augmented Dickey-Fuller (ADF) and Phillips-Perron (P.P.) unit root tests show that the time series data is stationary at first difference. Then, the co-integration analysis indicates that each economic sector has a strong, positive, and significant linear relationship with economic growth. Granger causality test found bi-directional causality between agriculture and GDP and also industry and agriculture. This empirical study also found the unidirectional granger causality from the services sector to agriculture and the industry sector to the services sector. Finally, the Vector Error Correction Model (VECM) is also used to examine the short and long-run equilibrium relationships among the variables. This study gives guidelines to investors and policymakers. (Moyen Uddin, 2015)

This study Looks at the world airline industry, from 1978 to 1998, from a strategy perspective. Traces the strategic developments and the strategy responses of the key airline players that have had a profound impact on the shape and direction of the industry. These include the deregulation of the industry, the nature and extent of competition, the emergence of brand differentiation based competition, and airline alliance developments, strategies and their implications. Also provides a glimpse of what the future will hold for the world airline industry, including the prospects of increased global market concentration and the emergence of mega consortia, comprising lead airlines from key regions of the world, on the global stage. These global consortia, which will marginalise other players, will also compete against each other on the basis of branding/differentiation(Schmeleva & Bezdelov, 2020)

This study aims to discuss the potential labour market effects of nanotechnology in Turkey. Today, nanotechnology is used by some sub-sectors of the manufacturing sector such as glass, ceramics, chemistry, textile, and automotive. It is estimated that it will become predominant and lead to a deep transformation in labour relations in long term. The rest of the paper is organized into three chapters. Chapter one provides a brief review of existing literature related to nanotechnology and the indicators of nanotechnology usage in Turkey. Chapter two presents the analysis of the probable effects of nanotechnology on labour market conditions. The main findings are provided in the final.(Rahman et al., 2011)

This study examines potential recovery pathways from the global aviation industry following the severe negative impacts of the COVID-19 pandemic. Using archival and secondary data mainly from Flightradar24, ICAO, IATA and EUROCONTROL, the study found that the pandemic inflicted a heavy toll on global aviation, which resulted in ratings downgrades, liquidation and bankruptcy of several airlines and airports due to severe cash burn instigated by travel restrictions. Although the industry is opening up, the recovery process seems much slower than anticipated, which could see more jobs and airlines failing in the absence of relevant support. The study recommends that as the sector opens up, it does so in a responsible manner, which puts measures that protect travellers, reduce costs, increase efficiency, and ensure a quality customer experience anchored on employees' health and customer safety(Dube et al., 2021)

References

Dube, K., Nhamo, G., & Chikodzi, D. (2021). COVID-19 pandemic and prospects for recovery of the global aviation industry. *Journal of Air Transport Management*, *92*(May 2021), 1–28. https://doi.org/10.1016/j.jairtraman.2021.102022

Dursun, E. (2022). The Nexus among Civil Aviation, Energy Performance Efficiency and GDP in terms of Ecological Footprint: Evidence from France and Finland. *International Journal of Energy Economics and Policy*,

12(5), 243–251. https://doi.org/10.32479/ijeep.13399

Gaulle, C. De. (2008). *Aviation in France*. 1–6.

IATA. (2016). *Netherlands Air Transport Regulatory Competitiveness Indicators*. 1–4.

ICAO. (2018). Aviation Benefits: contributing to global economic prosperity. *Uniting Aviation*, 1–2. https://www.unitingaviation.com/news/economic-development/aviation-benefits-for-a-better-future/

Janus, A. (2009). *Blériot's Cross-Channel Flight*. Airandspace.Si.Edu.

Moyen Uddin, M. M. (2015). Causal Relationship between Agriculture, Industry and Services Sector for GDP Growth in Bangladesh: An Econometric Investigation. *An International Peer-Reviewed Journal*, *8*(2006), 124–130. www.iiste.org

Musser, G., & Alpert, M. (2000). How to go to Mars. *Scientific American*, *282*(3), 44–51. https://doi.org/10.1038/scientificamerican0300-44

Ng, C. K., & Seabright, P. (2001). Competition, Privatisation and Productive Efficiency: Evidence from the Airline Industry. In *Source: The Economic Journal* (Vol. 111, Issue 473).

Rahman, M., Rahman, S., & Hai-bing, W. (2011). Time Series Analysis of Causal Relationship Among GDP, Agricultural, Industrial and Service Sector Growth in Bangladesh. *China-USA Business Review*, *10*(January). www.davidpublishing.com

Schmeleva, A., & Bezdelov, S. (2020). Improving the productivity of the Russian aircraft industry. *IOP Conference Series: Materials Science and Engineering*, *1001*(1), 012035. https://doi.org/10.1088/1757-899X/1001/1/012035

Tsoukalas, G., Belobaba, P., & Swelbar, W. (2008). Cost convergence in the US airline industry: An analysis of unit costs 1995-2006. *Journal of Air Transport Management*, *14*(4), 179–187. https://doi.org/10.1016/j.jairtraman.2008.04.005

CHAPTER 3

DATA ANALYSIS

3.1 INTRODUCTION

A statistics summary gives information about the data in a sample. It can help understand the values better. It may include the total number of values, minimum value, and maximum value, along with the mean value and the standard deviation corresponding to a data collection. With this, you can understand the trends, outliers, and distribution of values in a data set. This is especially useful when dealing with large amounts of data as it can help in analyzing the data better. This information can be utilized to steer the rest of the analysis and derive more information about a data set. These are values that are calculated based on the sample data and do not go beyond the data on hand statistics summary gives information about the data in a sample. It can help understand the values better. It may include the total number of values, minimum value, and maximum value, along with the mean value and the standard deviation corresponding to a data collection. With this, you can understand the trends, outliers, and distribution of values in a data set. This is especially useful when dealing with large amounts of data as it can help in analyzing the data better. This information can be utilized to steer the rest of the analysis and derive more information about a data set. These are values that are calculated based on the sample data and do not go beyond the data on hand.

The study was conducted with the following objectives:

1. To examine whether France's civil aviation industry is correlated with that nation's GDP growth.

2. To examine whether the growth of the civil aviation industry of France is correlated with the GNI growth of that nation.

3.2 SUMMARY STATISTICS

Summary statistics are a part of descriptive statistics that summarizes and provides the gist of information about the sample data. Statisticians commonly try to describe and characterize the observations by finding: a measure of location, or central tendency, such as the arithmetic mean.

Summary statistics provide a quick summary of data and are particularly useful for comparing one project to another, or before and after. There are two main types of summary statistics used in evaluation: measures of central tendency and measures of dispersion. Summary statistics summarize and provide information about your sample data. It tells you something about the values in your data set.

Table 3.1

Summary Statistics

	GDP*	GNI*	APT**
Mean	107530	148700	391.62
Median	107260	151170	360.2
Minimum	4683.4	48263	91.08
Maximum	2500900	240470	712.89

SD	809000	58044	195.13
C.V	0.75237	0.39033	0.49826
Skewness	0.19359	-0.07068	0.065167
kurtosis	-1.3669	-1.2531	-1.343

Source :secondary data

* Figures in Crores

*Figures in Lakhs

Table 3.1 shows a summary of GDP, GNI, and APT. GDP stands for Gross Domestic Product, GNI stands for Gross National Income, and APT stands for Airline Passenger Transport.

Mean

In statistics, the mean is one of the measures of central tendency. Mean is nothing but the average of the given set of values. It denotes the equal distribution of values for a given data set. Mean statistics show that the values of GDP (Gross Domestic Product) show crore figures, APT (Air Passenger Transport) shows lakhs figures and GNI (Gross National Income) shows crore figures. The Mean GDP is 107530 crore, GNP is 148700 crore and Air Passenger Transport is 391.62 lakh.

Median

The Median is defined as the middle value in a given set of numbers or data. In Mathematics, there are three different measures, which are used to find the average value for a given set of numbers. Median statistics show that the values of GDP

(Gross Domestic Product) show crore figures GNI (Gross National Income) show crore figures and APT (Air Passenger Transport) show in lakhs. The Median GDP is 10760 crore, GNI is 151170 crore and APT is 360.2 lakh.

Minimum

The minimum is the lowest or smallest amount possible or acceptable. Minimum statistics show that the values of GDP (Gross Domestic Product) show crore figures GNI (Gross National Income) shows in crores and APT (Air Passenger Transport) shows in lakhs. The minimum GDP is 4683.4 crore, Minimum GNI is 48263 crore and the APT is 91.08 lakhs.

Maximum

The maximum value in a set of values, excluding any outliers. Both are computed using either the interquartile rule or a user-defined statistical limit. The maximum of GDP is 2500900 crores, the maximum GNI is 240470 crores, and the APT is 712.89 lakhs.

Standard Deviation (S.D.)

standard Deviation is a measure that shows how much variation from the mean exists. The standard deviation indicates a “typical” deviation from the mean. It is a popular measure of variability because it returns to the original units of measure of the data set. The standard deviation of GDP is 809000 crore, GNI is 58044 crore and APT is 195.13 lakhs.

Coefficient of Variation (CV)

The coefficient of variation (CV) is the ratio of the standard deviation to the mean. The higher the coefficient of variation, the greater the level of dispersion around the mean. It is generally expressed as a percentage. CV of GDP is 0.75237 crore, CV of GNI is 0.39033 crore and APT is 0.49826 lakhs.

Skewness

Skewness is a measurement of the distortion of symmetrical distribution or asymmetry in a data set. The Skewness of GDP is 0.19359 crore, GNI is -0.07068 crore and APT is 0.065167 lakhs.

Kurtosis

Kurtosis is a statistical measure used to describe the degree to which scores cluster in the tails or the peak of a frequency distribution. Kurtosis of GDP is -1.3669 crore, GNI is -1.2531 crore and APT is -1.343 lakhs.

3.3 TREND ANALYSIS

Trend analysis is a technique used to examine and predict the movements of an item based on current and historical data. Using trend data to inform your decision-making, you can use trend analysis to improve your business. By comparing data over a specific period, you can spot patterns and project future events.

A trend is a general direction the market is taking during a specified period. Trends can be both upward and downward, relating to bullish and bearish markets, respectively. While there is no specified minimum amount of time required for a direction to be considered a trend, the longer the direction is maintained, the more notable the trend.

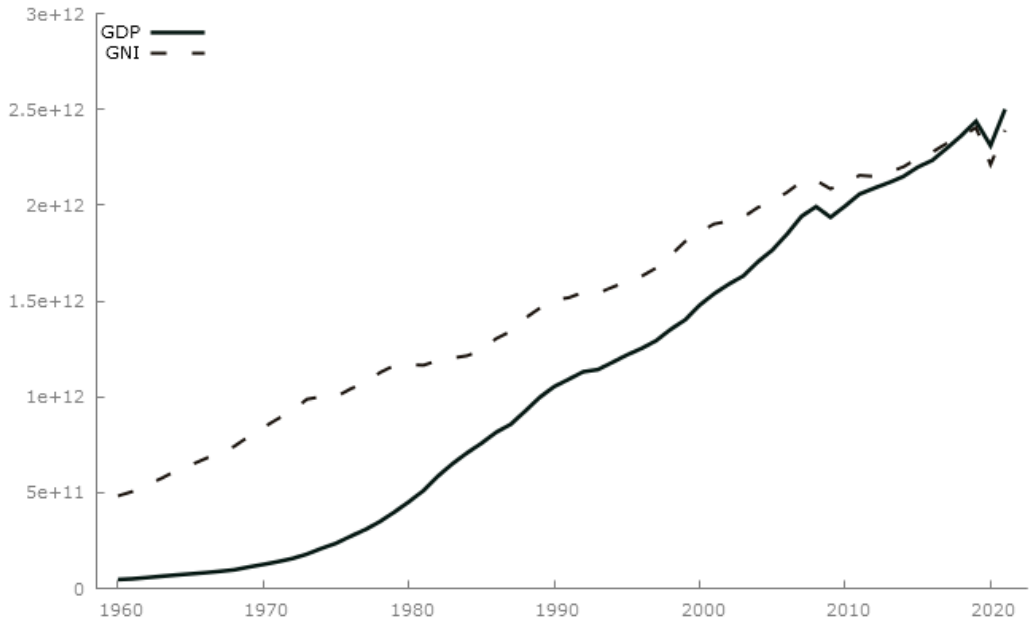
Trend analysis is the process of looking at current trends to predict future ones and is considered a form of comparative analysis. This can include attempting to determine whether a current market trend, such as gains in a particular market sector, is likely to continue, as well as whether a trend in one market area could result in a trend in another. Though a trend analysis may involve a large amount of data, there is no guarantee that the results will be correct.

3.3.1 GDP-GNI Trend

Time series plot is used to evaluate the growth trend of France with its growth of GDP and GNI. Figure 3.1 shows France's GDP trend with GNI for 1960 to 2020.

Figure 3.1

Time Trend – GDP and GNI



Source: Secondary Data, Prepared with Gretl

The above figure shows the comparison of movement of GDP (Gross Domestic Product) and GNI (Gross National Income) of France from 1960 to 2020. X axis

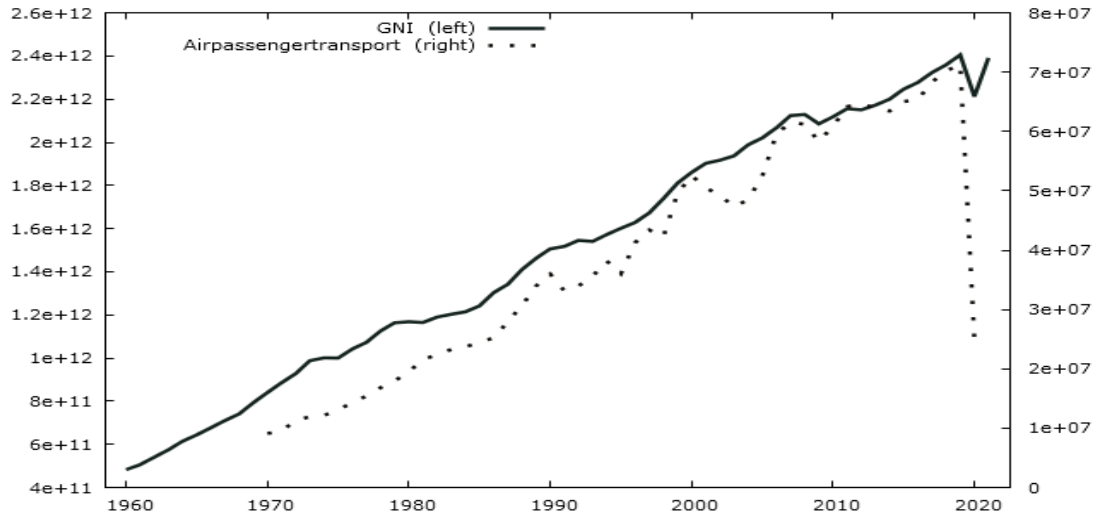
shows the years from 1960 to 2020 and Y axis shows the data related to GDP and GNI. The thick line indicating the trend of GDP and dotted line indicate the trend of GNI. From 1960 to 1970 there was almost a slight increase in GDP. A marked increase is seen from 1970 to 2019 in GDP. 2020 sees a slight decline in GDP. From 1960 to 2019, there is a marked increase in GNI. 2020 sees a slight decline in GNI. The growth of 2020 GDP and GNI decrease due to the transport restrictions caused by COVID. The change in the behavior of passengers following the COVID 19 crisis, travel restrictions and the ensuring economic crisis have resulted a drop in demand airline services. The trend of GDP and GNI is going in the same direction.

3.3.2 GNI – Air Passenger Transport Trend

Time series plot is used to evaluate the growth trend of France with its growth of GNI and Air Passenger Transport. Figure 3.2 shows France's GNI trend with Air Passenger Transport for 1960 to 2020.

Figure 3.2

Time Trend – GNI and Air Passenger Transport



Source: Secondary Data, Prepared with Gretl

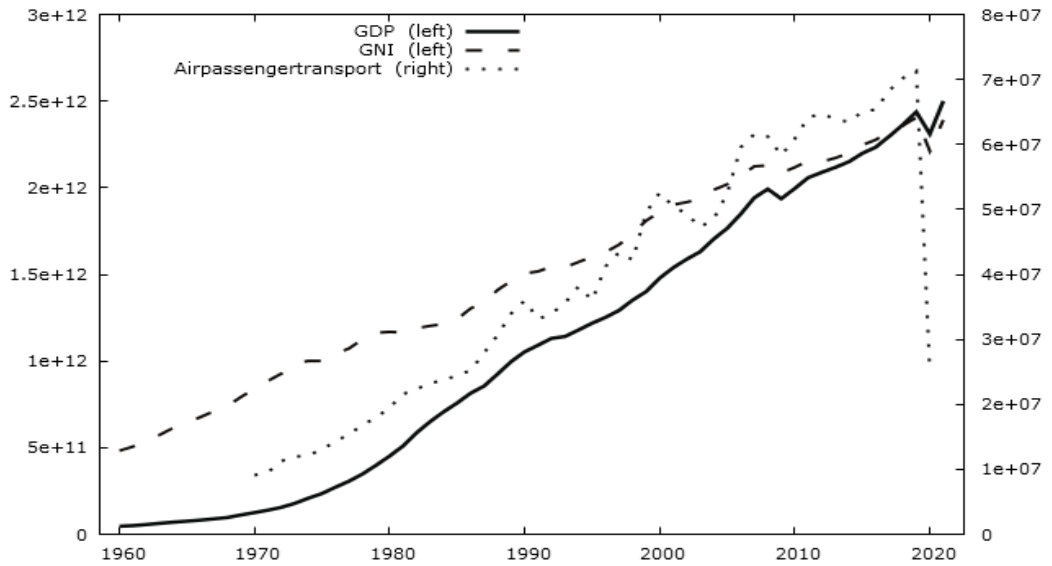
The above figure shows the comparison of movement of GNI (Gross National Income) and APT (Air Passenger Transport) of France from 1960 to 2020. X axis shows the years from 1960 to 2020 and Y axis shows the data related to GNI and Air Passenger Transport. The thick line indicating the trend of GNI and dotted line indicate the trend of Air Passenger Transport. A marked increase is seen from 1960 to 2019 in GNI. 2020 sees a considerable decline in GNI. From 1970 to 2019, there is a marked increase in Air Passenger Transport. 2020 sees a huge decrease in Air Passenger Transport. In 2020 the GNI and Air Passenger Transport decrease due to the transport control. Because of the COVID 19 pandemic situation the rate of passenger transport has decreased.

3.3.3 GDP, GNI and Air Passenger Transport Trend

Time series plot is used to evaluate the growth trend of France with its growth of GDP GNI and Air Passenger Transport. Figure 3.3 shows France's GDP and GNI trend with Air Passenger Transport for 1960 to 2020.

Figure 3.3

Time Trend – GDP, GNI, and Air Passenger Transport



Source: Secondary Data, Prepared with Gretl

The figure 3.3 shows the relation between GDP (Gross Domestic Product), GNI (Gross National Income) and APT (Air Passenger Transport) of France from 1960 to 2020. X axis shows the years from 1960 to 2020 and Y axis shows the data related to GDP, GNI and Air Passenger Transport. The thick line indicating the trend of GDP, dotted line indicate the trend of GNI and dotted straight line indicate the trend of Air Passenger Transport. From 1960 to 1970 there was almost a slight increase in GDP. A marked increase is seen from 1970 to 2019 in GDP. 2020 sees a slight decline in GDP. From 1960 to 2019, there is a marked increase in GNI. 2020 sees a considerable decline in GNI. From 1970 to 2019, there is a marked increase in Air Passenger Transport. 2020 sees a huge decrease in Air Passenger Transport. In 2020 the GDP and GNI and Air Passenger Transport decrease due to the transport control. Because of the COVID 19 pandemic situation the rate of passenger transport has decreased. The trend of GDP and GNI and Air Passenger Transport is going in the same direction.

3.4 CORRELATION ANALYSIS

Correlation analysis, also known as bivariate, is primarily concerned with finding out whether a relationship exists between variables and then determining the magnitude and action of that relationship. A correlation close to 0 indicates no linear relationship between the variables. The sign of the coefficient indicates the direction of the relationship. If both variables tend to increase or decrease together, the coefficient is positive, and the line that represents the correlation slopes upward.

Correlation analysis was carried out in the following dimensions

1. Growth trend of Air Passenger Transport and GDP
2. Growth trend of Air Passenger Transport and GNI
3. Growth trend of GDP and GNI

3.4.1 Correlation Analysis – Air Passenger Transport and GDP

Kendall's tau correlation analysis is carried out to examine the relationship between airline passenger transport and the GDP of the nation France. To test the statistical significance of the correlation the following null hypothesis is formulated.

$H_0 1$ There is no correlation between Airline Passenger transport and the GDP.

Kendall's tau correlation analysis is used to analyze the correlation between the two variables. The following table 3.2 show the calculation of rank for the correlation analysis.

Table 3.2

Calculation of Rank: APT-GDP

Year	APT in 1000	Rank	GDP in crore	Rank
1970	9108	51	12569.8	51
1971	9108	50	12569.8	50
1972	9108	49	12569.8	49
1973	9108	48	12569.8	48
1974	9108	47	12569.8	47
1975	9108	46	12569.8	46
1976	9108	45	12569.8	45
1977	9108	44	12569.8	44
1978	9108	43	12569.8	43
1979	9108	42	12569.8	42
1980	9108	41	12569.8	41
1981	9108	40	12569.8	40
1982	9108	39	12569.8	39
1983	9108	38	12569.8	38
1984	9108	37	12569.8	37
1985	9108	36	12569.8	36
1986	9108	34	81459.6	35
1987	9108	33	81459.6	34
1988	9108	32	81459.6	33
1989	9108	29	81459.6	32
1990	9108	27	81459.6	31
1991	9108	31	81459.6	30
1992	9108	30	81459.6	29
1993	9108	28	81459.6	28

1994	9108	25	81459.6	27
1995	36020.4	26	81459.6	26
1996	41252.6	24	81459.6	25
1997	43400.7	22	81459.6	24
1998	42232.4	23	81459.6	23
1999	49536.3	18	81459.6	22
2000	52581.3	15	81459.6	21
2001	50476.5	17	81459.6	20
2002	49305.9	19	81459.6	19
2003	47258.8	21	81459.6	18
2004	48543.5	20	81459.6	17
2005	52477.2	16	81459.6	16
2006	59537.9	13	81459.6	15
2007	61551.3	10	81459.6	13
2008	61214.7	11	81459.6	12
2009	58318.3	14	81459.6	14
2010	60864.4	12	81459.6	11
2011	64185.3	7	81459.6	10
2012	64683.8	6	81459.6	9
2013	63925.2	8	81459.6	8
2014	63434.3	9	81459.6	7
2015	65039.5	5	81459.6	6
2016	65362.7	4	81459.6	5
2017	68316.5	3	81459.6	4
2018	70188	2	81459.6	2
2019	71289.3	1	81459.6	1
2020	249563	35	81459.6	3

Source: Secondary Data, Gretl Output

This table shows the rank correlation analysis between Air Passenger Transport and GDP. The first rank of APT is in 2019 and the last rank is in 1970. The first rank of GDP is in 2019 and the last rank is in 1970. The rank of APT and GDP is going at a high rate.

The Table 3.3 show the test results correlation analysis

Table 3.3

Correlation Analysis – Airline Industry & GDP

Variables	coefficient (rho)	t value	P Value	Sig	Decision
GDP APT	0.94651584	20.5345	0.00000	<0.05	**Reject $H_0$1**

Source: Secondary Data, Gretl Output

Spearman's rank correlation coefficient (rho), two-tailed p-value

The P value of the test result is less than 0.05, the null hypothesis H_o1 is rejected, and it is concluded that the GDP of France is significantly correlated with the growth of its airline industry represented by Air Passenger Transport (APT).

3.4.2 Correlation Analysis – Air Passenger Transport and GNI

Kendall's tau correlation analysis was carried out to examine the relationship between airline passenger transport and the GNI of the nation of France. To test the statistical significance of the correlation the following null hypothesis is formulated.

$H_0$2 There is no correlation between Air Passenger Transport and GNI

Kendall's tau correlation analysis, is used to analyze the correlation between the two variables. The following table 3.4 show the calculation of rank for the correlation analysis.

Table 3.4

Calculation of Rank: GNI-APT

Year	GNI (in Crores)	Rank	APT in 1000	Rank
1970	84004	51	9108	51
1971	88580	50	9569	50
1972	92790	49	11285	49
1973	98782	48	11958	48
1974	100111	46	12159	47
1975	100012	47	13113	46

1976	104175	45	14302	45
1977	107295	44	15431	44
1978	112572	43	16821	43
1979	116363	42	17967	42
1980	116837	40	19521	41
1981	116491	41	21591	40
1982	118987	39	22372	39
1983	120294	38	23278	38
1984	121422	37	23694	37
1985	124163	36	24492	36
1986	130333	35	25211	34
1987	134156	34	27950	33
1988	140994	33	30667	32
1989	146222	32	33976	29
1990	150601	31	35964	27
1991	151740	30	33128	31
1992	154528	28	33964	30
1993	154059	29	35626	28
1994	157207	27	38170	25
1995	160116	26	36020	26
1996	162815	25	41253	24
1997	167207	24	43401	22
1998	173807	23	42232	23
1999	181010	22	49536	18
2000	186005	21	52581	15
2001	190198	20	50477	17
2002	191680	19	49306	19
2003	193688	18	47259	21
2004	198787	17	48544	20
2005	202010	16	52477	16
2006	206662	15	59538	13
2007	212348	12	61551	10
2008	212869	11	61215	11
2009	208511	14	58318	14
2010	211772	13	60864	12
2011	215548	9	64185	7
2012	215019	10	64684	6
2013	217155	8	63925	8
2014	219948	7	63434	9
2015	224591	5	65040	5

2016	227676	4	65363	4
2017	232262	3	68317	3
2018	235854	2	70188	2
2019	240469	1	71289	1
2020	221172	6	24956	35

Source: Secondary Data, Gretl Output

This table shows the rank correlation analysis between Air Passenger Transport and GNI. The first rank of APT was in 2019, and the last rank is in 1970. The first rank of GNI is in 2019 and the last rank is in 1970. The rank of APT and GDP is going at a high rate.

Table 3.5 how the test results correlation analysis

Table 3.5

Correlation Analysis – Airline Industry & GNI

Variable		Kendall's tau	z-score	p-value	Criterion	Decision
APT	GNI	0.90588	9.37303	0	<0.05	**Reject $H_0$2**

Source: Secondary Data, Gretl Output

Kendall's tau correlation, two-tailed p-value

The p-value of the test result is less than 0.05, the null hypothesis $H_0$2 is rejected, and it is concluded that France's GNI (Gross National Income) is significantly correlated with the growth of its airline industry by Air Passenger Transport (APT).

3.4.3 Correlation GDP and GNI

Kendall's tau correlation analysis was carried out to examine the relationship between the GDP (Gross Domestic Product) and GNI (Gross National Income) of the nation of France. To test the statistical significance of the correlation, the following null hypothesis is formulated.

$H_0$3 There is no correlation between GDP and GNI

Kendall's tau correlation analysis, is used to analyze the correlation between the two variables. The following table 3.6 show the calculation of rank for the correlation analysis.

Table 3.6

Calculation of Rank: GNI-APT

Year	GNI (in Crores)	Rank	GDP (in Crores)	Rank
1970	84004	51	12569.8	51
1971	88580	50	12569.8	50
1972	92790	49	12569.8	49
1973	98782	48	12569.8	48
1974	100111	46	12569.8	47
1975	100012	47	12569.8	46
1976	104175	45	12569.8	45
1977	107295	44	12569.8	44
1978	112572	43	12569.8	43
1979	116363	42	12569.8	42
1980	116837	40	12569.8	41
1981	116491	41	12569.8	40
1982	118987	39	12569.8	39
1983	120294	38	12569.8	38
1984	121422	37	12569.8	37
1985	124163	36	12569.8	36
1986	130333	35	81459.6	35
1987	134156	34	81459.6	34
1988	140994	33	81459.6	33
1989	146222	32	81459.6	32
1990	150601	31	81459.6	31
1991	151740	30	81459.6	30
1992	154528	28	81459.6	29
1993	154059	29	81459.6	28
1994	157207	27	81459.6	27
1995	160116	26	81459.6	26
1996	162815	25	81459.6	25
1997	167207	24	81459.6	24

1998	173807	23	81459.6	23
1999	181010	22	81459.6	22
2000	186005	21	81459.6	21
2001	190198	20	81459.6	20
2002	191680	19	81459.6	19
2003	193688	18	81459.6	18
2004	198787	17	81459.6	17
2005	202010	16	81459.6	16
2006	206662	15	81459.6	15
2007	212348	12	81459.6	13
2008	212869	11	81459.6	12
2009	208511	14	81459.6	14
2010	211772	13	81459.6	11
2011	215548	9	81459.6	10
2012	215019	10	81459.6	9
2013	217155	8	81459.6	8
2014	219948	7	81459.6	7
2015	224591	5	81459.6	6
2016	227676	4	81459.6	5
2017	232262	3	81459.6	4
2018	235854	2	81459.6	2
2019	240469	1	81459.6	1
2020	221172	6	81459.6	3

Source: Secondary Data, Gretl Output

This table shows the rank correlation analysis between GNI and GDP.The first rank of GNI is in 2019 and the last rank is in 1970. The first rank of GDP is in 2019 and the last rank is in 1970. The rank of APT and GDP is going at a high rate.

Table 3.7 show the test results correlation analysis

Table 3.7

Correlation Analysis – GDP & GNI

Variables	Kendall's tau	z-score	p-value	Criterion	Decision
GDP GNI	0.98942359	11.3585	0	<0.05	**Reject $H_0$3**

Source: Secondary Data, Gretl Output

Kendall's tau correlation, two-tailed p-value

The p-value of the test result is less than 0.05, the null hypothesis $H_0$2 is rejected and it is concluded that the GNI (Gross National Income) of France is significantly correlated with the growth of its airline industry by, GDP (Gross Domestic Product).

Conclusion

According to correlation and trend analysis, there is a correlation between France's civil aviation industry and the growth of GDP..The conclusion from this analysis is that there is mostly an increasing trend in GDP ,GNI and Air Passenger Transport of France. The conclusion is that GDP growth of France is significantly correlated with the growth of its airline industry represented by Air Passenger Transport.GNI and GDP growth of France is significantly correlated with the growth of its airline industry by Air Passenger Transport.

CHAPTER - 4

FINDINGS, SUGGESTIONS AND CONCLUSION

4.1 Introduction

It is possible that there is a relationship between the economic indicators of a country and the industrial growth of that country. The economic indicators indicate the overall progress of the country's various industries. If any industry is moving differently from the economic indicators, it is likely to be a distressed industry and an industry that is not getting enough attention. To understand this phenomenon, we studied the relationship between the growth of the France airline industry and economic indicators in that country. The following objectives were formulated for this purpose;

1. To examine whether France's civil aviation industry is correlated with that nation's GDP growth.

2. To examine whether the growth of the civil aviation industry of France is correlated with the GNI growth of that nation.

4.2 Findings

There exists relationship between the economic indicators of a country and the industrial growth of that country. The economic indicators are GDP and GNI. Following are the findings of civil aviation industry;

4.2.1 Movement of the civil aviation industry and GDP

1. From 1960 to 1970 there was almost a slight increase in GDP.
2. A marked increase is seen from 1970 to 2019 in GDP.
3. In 2020 there was a considerable decline in GDP due to covid pandemic.
4. From 1970 to 2019, there is a marked increase in Air Passenger Transport.
5. In 2020 there was a huge decrease in Air Passenger Transport.
6. The trend of GDP and Air Passenger Transport is going in the same direction.
7. GDP growth of France is significantly correlated with the growth of its airline industry represented by Air Passenger Transport.

4.2.1 Movement of civil aviation industry and GNI

1. From 1960 to 2019, there is a marked increase in GNI.
2. In 2020 there was a considerable decline in GNI due to covid pandemic.
3. From 1970 to 2019, there is a marked increase in Air Passenger Transport.
4. In 2020 there was a huge decrease in Air Passenger Transport.
5. The trend of GNI and Air Passenger Transport is going in the same direction.
6. GNI growth of France is significantly correlated with the growth of its airline industry by Air Passenger Transport.

4.3 Suggestions

1. France belongs to the high income group. Macro analysis shows that there is a relationship between the GDP and GNI of France and the growth of the Airline Industry. Therefore the comparison of the growth of an industry with the economic indicators would help the industry's strength.
2. Further research is also suggested for the comparison of industrial growth with economic indicators.

4.4 Conclusion

According to correlation and trend analysis, there is a correlation between France's civil aviation industry and the growth of GDP. Growth of GNI and civil aviation industry has been correlated by correlation and trend analysis. There is a relationship between the economic indicators of a country and industrial growth because the economic indicators indicate the country's overall progress.

BIBLIOGRAPHY

1. Aeroaviation. (2009). *History of Aviation*. Aeroaviation.Org. https://doi.org/10.1007/978-1-4020-8664-9_1
2. Aeroaviation. (2023). *About Aero Aviation*. Https://Aeroaviation.Org/.
3. Bank, W. (2022). *GDP (current US $) - France*. The World Bank.
4. Dube, K., Nhamo, G., & Chikodzi, D. (2021). COVID-19 pandemic and prospects for recovery of the global aviation industry. *Journal of Air Transport Management*, *92*(May 2021), 1–28. https://doi.org/10.1016/j.jairtraman.2021.102022
5. Dursun, E. (2022). The Nexus among Civil Aviation, Energy Performance Efficiency and GDP in terms of Ecological Footprint: Evidence from France and Finland. *International Journal of Energy Economics and Policy*, *12*(5), 243–251. https://doi.org/10.32479/ijeep.13399
6. Gaulle, C. De. (2008). *Aviation in France*. 1–6.
7. IATA. (2016). *Netherlands Air Transport Regulatory Competitiveness Indicators*. 1–4.
8. ICAO. (2018). Aviation Benefits: contributing to global economic prosperity. *Uniting Aviation*, 1–2. https://www.unitingaviation.com/news/economic-development/aviation-benefits-for-a-better-future/
9. Janus, A. (2009). *Blériot's Cross-Channel Flight*. Airandspace.Si.Edu.
10. Moyen Uddin, M. M. (2015). Causal Relationship between Agriculture, Industry and Services Sector for GDP Growth in Bangladesh: An Econometric Investigation. *An International Peer-Reviewed Journal*,

8(2006), 124–130. www.iiste.org

11. Musser, G., & Alpert, M. (2000). How to go to Mars. *Scientific American*, *282*(3), 44–51. https://doi.org/10.1038/scientificamerican0300-44

12. Ng, C. K., & Seabright, P. (2001). Competition, Privatisation and Productive Efficiency: Evidence from the Airline Industry. In *Source: The Economic Journal* (Vol. 111, Issue 473).

13. Rahman, M., Rahman, S., & Hai-bing, W. (2011). Time Series Analysis of Causal Relationship Among GDP, Agricultural, Industrial and Service Sector Growth in Bangladesh. *China-USA Business Review*, *10*(January). www.davidpublishing.com

14. Schmeleva, A., & Bezdelov, S. (2020). Improving the productivity of the Russian aircraft industry. *IOP Conference Series: Materials Science and Engineering*, *1001*(1), 012035. https://doi.org/10.1088/1757-899X/1001/1/012035

15. Tsoukalas, G., Belobaba, P., & Swelbar, W. (2008). Cost convergence in the US airline industry: An analysis of unit costs 1995-2006. *Journal of Air Transport Management*, *14*(4), 179–187. https://doi.org/10.1016/j.jairtraman.2008.04.005

Books

16. Cottrell, A., & Lucchetti, R. J. (2020). *Gretl Function Package Guide*. Free Software Foundation.

17. Cottrell, A., & Lucchetti, R. "Jack." (2022). *Gnu Regression, Econometrics and Time-series Library*. Free Software Foundation.

APPENDIX

Data Collected from The World Bank

Year	GDP	GNI	Air Passenger Transport
1960	46834000000	482631973800	
1961	50775000000	506209568200	
1962	56906000000	541118228400	
1963	63794000000	575015646400	
1964	70755000000	614724104200	
1965	76422000000	644223757000	
1966	82826000000	677094528000	
1967	89545000000	710749264900	
1968	97683000000	741356796700	
1969	112366000000	793110166000	
1970	125698000000	840034832000	9108000
1971	140192000000	885794983000	9569200
1972	156487000000	927900830000	11285100
1973	179495000000	987818832000	11957500
1974	209367000000	1001110952000	12159300
1975	235876000000	1000124253000	13112800
1976	272612000000	1041754398000	14301900
1977	306807000000	1072946517000	15431300
1978	348615000000	1125718152000	16821200
1979	398210000000	1163627486000	17967000
1980	451770000000	1168369917000	19521000
1981	509985000000	1164909453000	21591200
1982	585989000000	1189866678000	22372400
1983	650512000000	1202941506000	23278100
1984	707030000000	1214219385000	23694300
1985	757689000000	1241625612000	24491900
1986	814596000000	1303332070000	25211400
1987	855983000000	1341558485000	27950200
1988	925215000000	1409943527000	30667300
1989	997121000000	1462220317000	33975500
1990	1053546000000	1506010075000	35963900
1991	1091705000000	1517397889000	33127800
1992	1130983000000	1545275489000	33963900
1993	1142119000000	1540594506000	35625600
1994	1179867000000	1572070047000	38170400
1995	1218273000000	1601159461000	36020400
1996	1252266000000	1628153079000	41252600
1997	1292777000000	1672069823000	43400700
1998	1351896000000	1738065147000	42232400
1999	1400999000000	1810104257000	49536300
2000	1478585000000	1860050404000	52581312
2001	1538200000000	1901984919000	50476541
2002	1587829000000	1916804165000	49305864
2003	1630666000000	1936875558000	47258820

2004	1704019000000	1987869792000	48543473
2005	1765905000000	2020096790000	52477178
2006	1848151000000	2066622661000	59537872
2007	1941360000000	2123477191000	61551258
2008	1992380000000	2128694892000	61214656
2009	1936422000000	2085114524000	58318312
2010	1995289000000	2117722892000	60864422.11
2011	2058369000000	2155480570000	64185339.34
2012	2088804000000	2150189988000	64683769.02
2013	2117189000000	2171546724000	63925151
2014	2149765000000	2199475832000	63434263
2015	2198432000000	2245909000000	65039503
2016	2234129000000	2276759530000	65362743
2017	2297242000000	2322617142000	68316473
2018	2363306000000	2358535903000	70188028
2019	2437635000000	2404693165000	71289277
2020	2310469000000	2211720843000	24956343