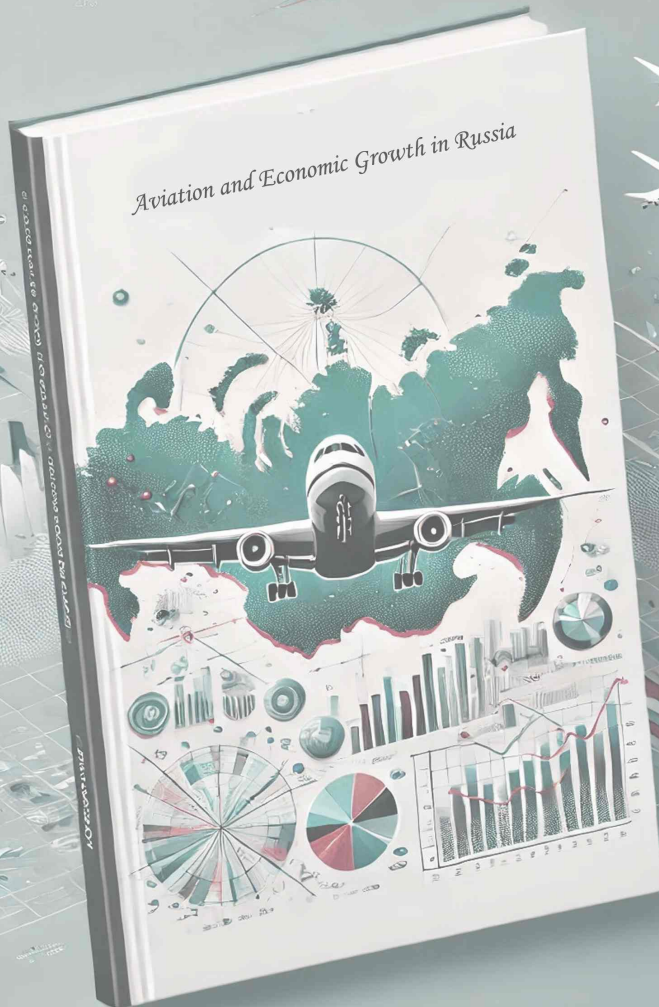


Aviation and Economic Growth in Russia



Hilda Jose and Bobby Thomas



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Aviation and Economic Growth in Russia

Based on the PG dissertation titled

“A time series analysis on the movement of the growth of civil aviation in Russia with its economic development indicators”

By

Hilda Jose and Bobby Thomas

(Pavanatma College, Murickassery)

Aviation and Economic Growth in Russia

Authors:

Hilda Jose

MCM 2021-23 batch, Pavanatma College, Murickassery.

Boby Thomas

Assistant Professor of Commerce, Pavanatma College, Murickassery.

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Preface

This book, *Aviation and Economic Growth in Russia*, explores the intricate relationship between Russia's civil aviation industry and its broader economic development. Originating from my postgraduate dissertation, *A Time Series Analysis on the Movement of the Growth of Civil Aviation in Russia with its Economic Development Indicators*, this study delves into the dynamics of one of the most transformative sectors in Russia. Aviation, as a critical enabler of economic growth, has become indispensable for global connectivity, trade, and tourism. Through statistical analysis and time series data, I aim to present a comprehensive perspective on how Russia's economic indicators such as GDP, GNP, air passenger traffic, and cargo volumes interact with and influence the trajectory of the civil aviation sector.

This research spans over three decades, from 1988 to 2021, providing a rich historical context to analyze shifts in Russia's economy and its civil aviation growth. Utilizing data from the World Bank and advanced statistical techniques, the study sheds light on how economic fluctuations, international trends, and external shocks have impacted Russia's aviation industry. The findings indicate that while there is a correlation between economic indicators and the aviation sector, this relationship is complex and not always stable, particularly during events like the COVID-19 pandemic.

My motivation for this book stems from the desire to contribute meaningful insights to the field of economic and industrial analysis, particularly in understanding the forces shaping the aviation industry. I hope this work provides valuable information for students, researchers, policymakers, and industry professionals interested in the evolving intersections of aviation and economic growth. By presenting both theoretical and practical implications, I aim to enhance our understanding of how one of Russia's pivotal industries influences and is influenced by the country's economic landscape.

I extend my heartfelt gratitude to my mentors, colleagues, and all those who have supported this endeavor. It is my sincere hope that this book will not only advance academic discourse but also inform strategic decision-making in the field of aviation and economic policy.

Thank you for joining me on this exploration of *Aviation and Economic Growth in Russia*.

Hilda Jose

01-01-2024

Abstract

This study investigates the correlation between the growth of Russia's civil aviation industry and key economic indicators, including GDP, GNP, air passenger traffic, and air cargo volume. As one of the largest economies, Russia's industrial sectors play a crucial role in driving national economic growth, creating jobs, and fostering international trade and tourism. Civil aviation, a pivotal industry, enables rapid global connectivity, supporting economic activities across regions and sectors. Using time series data from 1988 to 2021 sourced from the World Bank, the study employs statistical tools such as correlation analysis, the ADF unit root test, and Engle-Granger cointegration tests to examine the relationship between the Russian aviation industry and the nation's economic growth.

The findings reveal that, although there exists a significant correlation between economic indicators and aviation sector performance, there is no consistent co-integrated relationship between Russia's civil aviation industry growth and its GDP or GNP trends. The study identifies that while air passenger traffic and cargo volumes have increased over time, they are not proportionally aligned with the fluctuations in GDP and GNP. Notably, external factors like the COVID-19 pandemic have impacted the industry's growth trajectory, illustrating the dynamic nature of this relationship.

This study addresses a research gap on the interconnectedness between industrial growth and economic indicators within Russia's civil aviation sector, contributing valuable insights for policymakers and industry stakeholders. Theoretical implications highlight that while economic indicators serve as predictors of industry growth, they do not always guarantee a stable co-integrated relationship, emphasizing the complexity of economic-industrial linkages in Russia's evolving market environment.

Russian Economic Transformation and The Rise of Civil Aviation

Russia, one of the world's largest economies by both landmass and natural resources, has a complex economic history shaped by periods of centralization, liberalization, and modernization. The nation's economic trajectory has been marked by significant transformations, particularly since the collapse of the Soviet Union in 1991, which shifted Russia from a centrally planned economy to a market-based economy. This transition led to a series of economic reforms, structural changes, and adaptation to global economic dynamics.

Historical Background and Economic Shifts

Under the Soviet Union, Russia's economy was highly centralized, with the government exercising control over industries, production targets, and trade. This system allowed for rapid industrialization and resource mobilization, but it was also rigid and resistant to innovation. The dissolution of the Soviet Union in 1991 marked a pivotal turning point, opening Russia to privatization, foreign investment, and international trade. However, this shift brought challenges, including economic volatility, inflation, and an initial decline in GDP.

In the early 2000s, Russia began to recover under stable governance, benefiting from high oil and natural gas prices, which are among its primary exports. This resource-based economic boom improved government revenues, allowing investment in infrastructure, defense, and social programs, while strengthening the ruble and fostering economic growth. However, over-reliance on oil and gas revenues has made the economy vulnerable to global price fluctuations.

Russia's Economic Transformation and Civil Aviation Growth

The economic transformation in Russia has significantly influenced its transportation sector, including civil aviation. Economic reforms and the influx of capital in the early 2000s paved the way for modernization within the aviation industry, with investments in airport infrastructure, fleet expansion, and the establishment of new routes. This growth in civil aviation reflects broader economic changes and symbolizes Russia's

integration into global trade and tourism networks. Economic development indicators such as GDP growth, foreign direct investment, and trade balances have provided a foundation for the aviation sector's expansion, supporting both passenger traffic and air freight.

The growth of civil aviation in Russia also mirrors other post-1991 economic transformations. As the nation reoriented towards a market economy, demand for domestic and international travel surged. Additionally, economic diversification efforts encouraged the development of sectors beyond natural resources, indirectly supporting aviation by fostering tourism, business travel, and logistical networks. Consequently, civil aviation became a key player in Russia's strategy to enhance connectivity and economic mobility.

Current Economic Indicators and Aviation's Role

Today, Russia's economy is shaped by a mix of legacy industries (such as oil, gas, and metals) and emerging sectors like technology and services. The government continues to pursue economic diversification, which is crucial in reducing dependency on volatile energy markets. The growth of civil aviation aligns with this objective by enabling both domestic and international business connectivity, supporting tourism, and facilitating regional economic integration.

In recent years, various economic indicators such as Gross Domestic Product (GDP), inflation, and foreign trade have directly impacted the aviation industry. The ruble's valuation, for instance, influences ticket prices and operating costs, while inflation can affect consumer spending on travel. Therefore, understanding the correlation between these economic indicators and the growth of civil aviation in Russia provides critical insights into the interconnectedness of economic policies, market trends, and sector-specific developments in Russia's post-Soviet economy.

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CHAPTER – 1
INTRODUCTION

1.1 Introduction

Russia is one of the largest countries in South Asia. Industries contribute to the economic development of a nation. Hence the correlation between the growth of an industry and the economic indicators. The study is an attempt to examine whether there exists a correlation between the economic growth of a nation with that of its key industries. It generates economic growth, creates jobs, and facilitates international trade and tourism. ² Aviation provides the only rapid worldwide transportation network, which makes it essential for global business. This study demonstrates that qualitative and quantitative research methods help Russian civil aviation to develop in the future. The study deals with the relationship between economic indicators and industrial growth and here shows the importance of economic indicators and industrial growth. Air transportation is a beneficial industry that helps people to easily travel from city to city and nation to nation. “Air transport facilitates flows of goods, investment, and people and the economy can be seen from the spending of foreign tourists and the value of exports ” (Coursehero, 2022). As per a report by IATA “Europe is the largest market for passenger flows to and from the Russian Federation, followed by Asia-Pacific and the Middle East. Of the total passenger traffic, 68.1 percent of the total passengers arrived from Europe, 28.5 percent of passengers arrived from Asia-Pacific and 1.8 percent of passengers arrived from the Middle East” (IATA, 2018).

1.1 Significance of the Study

The Russian Federation is a middle-income nation as per the classification of the World Bank geographically placed in the Asia Pacific. Data are published by relating some studies on the relationship between economic indicators and industrial growth. But this study makes a major contribution to the research gap as this is an underexplored area. Studies illustrate a deep relationship between economic indicators such as GDP, GNP, air passenger cargo, air passenger traffic, and industrial growth. This study tells about the importance of economic indicators in the industrial growth of a country. Civil aviation is an important industry in any

country. This study proves to be of great importance as the relationship with other countries lies with this industry. Russia is the leading communist country and a country of great economic power increases the importance of the study.

1.3 Statement of the problem

Russia is one of the largest countries in South Asia. It has the world's ninth-largest economy by nominal GDP. Russia's economic and industrial growth is important because it is one of the few rich countries under the socialist-communist system. Some studies have pointed out that the industrial growth of a country is related to its economic indicators. The study deals with the relationship between economic indicators and industrial growth and here shows the importance of economic indicators and industrial growth.

Hence the study of the growth of civil aviation is integrated with the economic development of any nation there the present study is titled: **“A time series analysis on the Movement of the civil aviation Industry of Russia with its Economic Indicators”**.

1.4 Objective of the study

1. To examine whether the growth of the Airline industry of Russia is correlated with the GDP growth of that nation.
2. To examine whether the growth of the Airline industry of Russia is correlated with the GNP growth of that nation.
3. To examine whether the growth of air passenger traffic in Russia is correlated with the air cargo growth of that nation.
4. To examine whether the growth of air passenger traffic and GDP has a cointegrating relationship.

1.5 Methodology of the Study

The study makes use of the secondary data published by the World Bank. The nature and source of data, tools of analysis, and period of study describe the methodology of the study.

1.5.1 Nature and Source of Data

The researcher used secondary data collected from the published record of the World Bank (The World Bank, 2022). **We use data for 33 years from 1988 to 2021** and the development indicators related to the airline industry of Russia were collected and used for analysis.

1.5.2 Tools of Analysis

Time series trend projection, Correlation analysis, ADF unit root test, and Engle-Granger cointegration test are the statistical tools used in this analysis.

1.5.3 Period of study

We use the data from 1988 to 2021.

1.5.4 sample selection

- Selection of nation
High-income nation
Random sampling methods (lottery method)
- Selection of industry

1.6 Hypothesis

- H₀₁ The Growth of the Airline industry of GDP in Russia is not correlated with the growth of its Air Passenger Traffic.
- H₀₂ The Growth of the Airline industry of GNP in Russia is not correlated with the growth of its Air Passenger Traffic.
- H₀₃ The Growth of the Airline industry of GDP in Russia is not correlated with the growth of its air cargo.

- H₀₄ The Growth of the Airline industry of GNP in Russia is not correlated with the growth of its air cargo.
- H₀₅ The Growth of Air Passenger traffic in Russia is not correlated with the growth of its air cargo.
- H₀₆ The Growth of Air Passenger traffic in Russia and GDP shows a cointegrated relationship.

1.7 Limitations of the Study

- i. The period of study was limited to 33 years from 1988 to 2021
- ii. Inherent limitations of secondary data and statistical tools may have affected the study to a certain extent.

1.8 Chapter scheme

The presentation of the report is divided into five chapters. Airline industry of Russia 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 Literature Review

This chapter contains the airline industry of Russia literature review; The current situation in the Russian aviation industry. The data relating to the four economic indicators of the country Russia has been collected here. Mainly GDP GNP air cargo air passenger traffic sources have been collected as a literature review.

Chapter- 3 Theoretical Framework

This chapter describes the airline industry through of Theoretical framework; Here is collected the study about the relationship of GDP with different types of industries

in many countries. Here the industries related to GDP are the agriculture industry, industrial sectors, service sectors, aviation industry, and other industries.

This chapter presents the analysis of observed facts in collected quantitative terms. Introduction of data analysis, the nature of data, and 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 GDP and Air Passenger Traffic
2. Growth Trend of GNP and Air Passenger Traffic
3. Growth Trend of GDP and Air Cargo
4. Growth Trend of GNP and Air Cargo
5. Growth Trend of Air Passenger Traffic and Air Cargo

The trend analysis shows graphs and the correlation analysis shows tables.

Chapter 4 – Findings, Conclusions, Suggestions

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

Reference

IATA. (2018). *The importance of air transport to the Russian Federation*.

<https://www.iata.org/en/iata-repository/publications/economic-reports/russian-federation--value-of-aviation/>

The World Bank. (2022). GDP growth (annual %) - Russian Federation. In *The World Bank*.

<https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=RU>

Coursehero. (2022). *About Aero Aviation*. Greece--Value-of-Aviation.

<https://www.coursehero.com/file/143776697/greece-value-of-aviationpdf/>

CHAPTER -2
REVIEW OF LITERATURE

2.1 Introduction

The object of the research is the civil aviation of the Russian Federation. It generates economic growth, creates jobs, and facilitates international trade and tourism. The current situation in the Russian aviation industry. Hence the correlation between the growth of an industry and the economic indicators. The study is an attempt to examine whether there exists a correlation between the economic growth of a nation with that of its key industries. The data relating to the four economic indicators of the country Russia has been collected here. Mainly GDP GNP air cargo air passenger traffic sources have been collected. As per the report of Coursehero, “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” (Coursehero, 2022). This study demonstrates that qualitative and quantitative research methods help Russian civil aviation to develop in the future.

2.2 Russian Aviation Industry

The current situation in the Russian aviation industry and its development prospects have been under discussion over the last few years. This is because both the Russian and world economies are getting more and more politically motivated, and the current situation in the world markets mostly depends on political factors. “The object of the research is the civil aviation of the Russian Federation. The research subjects are economic interacting processes in the sphere aircraft industry and organizational and economic aspects of aviation industry reformation in Russia”. In the study follow many problems were stated the main development trends of domestic and foreign passenger air travel, Russian and foreign experience of Aviation Research and Development financing were analyzed. “The analysis of the current state and future development of civil aviation in Russia was carried out with the help of qualitative and quantitative research methods” (P. Neverov, N. Pislegina, 2013).

From a strategy perspective, this study Looks at the world airline industry from 1978 to 1998. Airline companies’ strategic plans shaped the direction of the airline

industry. The strategy includes deregulation, competition, brand differentiation, airline alliance, etc. The future of the world airline industry, including the emergence of mega-consortia comprising leading airlines from major regions of the world and the potential for increased global market concentration (Schmeleva & Bezdelov, 2020).

“Gross Domestic Product (GDP) in Russia contracted 3.4 % in Sep 2022, following negative growth of 3.4 % in the previous quarter” (CEIC, 2022).

A study conducted by Dube examined the potential recovery pathways for the global aviation industry after the COVID-19 pandemic. In this study mainly they used archival and secondary data from Flightrader24, ICAO, IATA, and EUROCONTROL. The study found that “the pandemic situation has created a heavy impact. We recommend that as the sector opens up, it does so in a responsible manner, which puts measures that protect travelers, reduce costs, increase efficiency, and ensure a quality customer experience anchored on employees' health and customer safety” (Dube et al., 2021a).

2.3 Conclusion

P. Neverov, N. Pislegina, says that the current situation in the Russian airline industry is about its development potential because the current situation in the world market depends mostly on political phases. Schmeleva & Bezdelov, tells us about the airline industry from 1978 to 1998. This study is about the major airline industry that had a profound influence on the shape and direction of the industry. Here's a look at what the future holds for the world airline industry, including the potential of the global market, which includes major airlines from major regions of the world. In this study, CELC says that Gross Domestic Product (GDP) in Russia contracted by 3.4 % in Sep 2022, following negative growth of 3.4 % in the previous quarter. Dube says that the study examines the recovery of the airline industry following adverse conditions during the Covid-19 pandemic.

References

- CEIC. (2022). *Russia Real GDP Growth*. CEIC.
<https://www.ceicdata.com/en/indicator/russia/real-gdp-growth>
- Coursehero. (2022). *About Aero Aviation*. Greece--Value-of-Aviation.
<https://www.coursehero.com/file/143776697/greece-value-of-aviationpdf/>
- Dube, K., Nhamo, G., & Chikodzi, D. (2021a). 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>
- P. Neverov, N. Pislegina, S. L. & S. S. B. (2013). The analysis of problems and development prospects of civil aviation in Russia. *Paper Knowledge. Toward a Media History of Documents*, 12–26.
- Schmeleva, A. N., & Bezdelov, S. A. (2020). Problems and mechanisms to improve the Russian aviation industry's productivity in the sharing economy. *IOP Conference Series: Materials Science and Engineering*, 1001(1).
<https://doi.org/10.1088/1757-899X/1001/1/012026>

CHAPTER-3

THEORETICAL FRAMEWORK

3.1 Introduction

This chapter establishes the relationship between GDP and the growth of industries. Studies show that agriculture, the aviation industry, and the service sector have a relationship with GDP in some countries. For example, A study examining the agricultural, industrial, and service sectors of Bangladesh, A study examining the agricultural, industrial, and service sectors of Turkey, This study examines the contribution of the agriculture, industry, and services sectors in Bangladesh, A study examining the economic growth and different components of the industrial sectors of Pakistan, “A study examining the integrated investigation of the interrelations among economic performance, organizational capacity, and organizational capability in the airline industry.”

3.2 GDP-Agriculture Relationship

A study examining the agricultural, industrial, and service sectors of Bangladesh. “Mostafizur Rahman, et used the Granger causality/block homogeneity Wald tests statistics to examine the causal relationship among these variables. From the empirical study we found the existence of a long-run equilibrium relationship among these variables and bi-directional causality is observed between GDP and agricultural sector, industrial sector and GDP, and also industrial sector and service sector”. The empirical study also found the unidirectional Granger causality from the industrial sector to the agricultural sector and GDP to the service sector (Rahman et al., 2011).

A study examining the agricultural, industrial, and service sectors of Turkey .“ fetiz, filiz ozden, employed the Engle-Granger causality/block homogeneity Wald test, Impulse Response, and Variance Decomposition analysis. The results showed unidirectional Granger causality from agriculture to GDP and the other three sectors, while the agricultural sector is not influenced by the others.” “This is an expected result for any developing country where agriculture accounts for a large proportion of national GDP, but an unexpected result for developed countries like European Union members which Turkey has long been wishing to join”. “To our knowledge,

although this method has been applied in various areas, sectoral causality has not been studied in Turkey”(fetiz, filiz ozden, 2017).

This study examines the contribution of the agriculture, industry, and services sectors in Bangladesh. “Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests show that the time series data is stationary at first difference. Then, the cointegration 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”. These study guidelines to investors and policymakers (Moyen Uddin, 2015).

3.3 GDP -Industrial sector of the economy

A study examining the economic growth and different components of the industrial sectors of Pakistan. “The first step in the empirical analysis involves testing the time series characteristics of the data series using ADF tests, Simple linear regression, and time series techniques applied to estimate the relationships”. As per the report Ajmair “Regarding the hypotheses of the study, it is concluded that the entire hypothesis, which has a positive impact on GDP, is partially accepted. Because in simple linear regression, all the components of the industrial sector show a positive relationship with GDP except the mining and quarrying sector which not only shows a negative relationship but also gives an insignificant result”(Ajmair, 2014). “All other results are statistically significant and consistent in simple linear regression”(Ajmair, 2017).

3.4 GDP-Aviation Industry Relationship

As per the report of Erdil & Yildiz, “The study revealed the contribution of the Nigerian Aviation Industry to the National GDP of Nigeria(Erdil & Yildiz, 2011a). “To this end, we determined the performance of the aviation workers with regards to contribution to the national GDP; determined the performance of the Nigerian labor force’s contribution to the GDP and compared the contribution per head of

aviation workers to the aviation industry's revenue of aggregated product; we ascertained the aviation industry's percentage contribution to the National GDP and did forecast the growth of the GDP, aviation industry and its workers' contribution to GDP". "To achieve what we did we used secondary data obtained from the National Bureau of Statistics from 1985 to 2012 for the National GDP; the aviation industry's contribution to the GDP; the annual estimates of the Nigerian labor force; the annual estimates of laborers employed in the aviation industry; the annual throughput and revenue in the industry"(Stephens et al., 2014).

"A study examining the integrated investigation of the interrelations among economic performance, organizational capacity, and organizational capability in the airline industry. The research findings demonstrate the significant and intertwined roles of economic performance in enhancing airline capacity and capability" (Salarzadeh Jenatabadi et al., 2013).

3.5 GDP – Service Sector Relationship

Erdil & Yildiz, says that "Creating a difference in every section of the service is a key factor to success in the realization of these purposes"(Erdil & Yildiz, 2011a). "When service quality is thought as an important factor for creating a difference in the service industry, the importance of estimating service quality provided to customers comes out. Estimating service quality is a hard issue for service firms because services are intangible, heterogeneous, perishable, and inseparable". "Estimating service quality provides service firms with how to manage their marketing operations appropriately". "Estimating service quality is a hard issue for service firms because services are intangible, heterogeneous, perishable, and inseparable"(Erdil & Yildiz, 2011b).

3.6 Conclusion

The theories stated that the industry growth of a nation correlates with the economic indication of that nation. Hence a nation analysis can establish a relationship to predict the industry growth for the economic industry.

Reference

- Ajmair, M. (2014). European Journal of Contemporary Economics and Management May 2014 Edition Vol.1 No.1106I. *IMPACT OF INDUSTRIAL SECTOR ON GDP (PAKISTAN CASE)*.
<http://docplayer.net/34425795-Impact-of-industrial-sector-on-gdp-pakistan-case.html>
- Ajmair, M. (2017). Impact of industrial sector on GDP (Pakistan Case). *European Journal of Contemporary Economics and Management*, June 2014.
- Coursehero. (2022). *About Aero Aviation. Greece--Value-of-Aviation*.
<https://www.coursehero.com/file/143776697/greece-value-of-aviationpdf/>
- Erdil, S. T., & Yildiz, O. (2011a). Measuring service quality and a comparative analysis in the passenger carriage of airline industry. *Procedia - Social and Behavioral Sciences*, 24, 1232–1242.
<https://doi.org/10.1016/j.sbspro.2011.09.117>
- Erdil, S. T., & Yildiz, O. (2011b). Measuring service quality and a comparative analysis in the passenger carriage of airline industry. *Procedia - Social and Behavioral Sciences*, 24, 1232–1242.
<https://doi.org/10.1016/j.sbspro.2011.09.117>
- fetiz, filiz ozden, C. (2017). Analysis of Causal Relationship Among Gdp, Agricultural, Industrial and Services Sector Growth in Turkey. *Ömer Halisdemir Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 10(3), 75–84. <https://doi.org/10.25287/ohuiibf.305729>
- 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
- 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

Salarzadeh Jenatabadi, H., Huang, H., Ismail, N. A., Satar, N. B. M., & Mohamed Radzi, C. W. J. bt W. (2013). Impact of Economic Performance in Organizational Capacity, Capability: A Case Study in Airline Industry. *International Journal of Business and Management*, 8(17), 112–120.
<https://doi.org/10.5539/ijbm.v8n17p112>

Stephens, M. S., Ikeogu, V., Stephens, O. B., & Ukpere, W. I. (2014). *Empirical Analysis of the Contribution of the Aviation Industry to the Nigerian Economy*. 5(3), 115–125. <https://doi.org/10.5901/mjss.2014.v5n3p115>

CHAPTER-4

DATA ANALYSIS

4.1 Introduction

The present analysis is conducted to examine the relationship between airline industry growth and the growth of economic indicators like Gross Domestic Product, Gross National Product, Air Passenger Traffic, and Air Cargo. Time series data analysis with the help of Gretl, an open-source time series data analysis software is used for this purpose. The study has mainly three parts: Trend Analysis, Correlation Analysis, and Regression Analysis.

The study was conducted with the following objectives:

1. To examine whether the growth of the civil aviation industry of Russia is correlated with the GDP growth of that nation.
2. To examine whether the growth of the civil aviation industry of Russia is correlated with the GNP growth of that nation.
3. To examine whether the growth of air passenger traffic in Russia is correlated with the air cargo growth of that nation.
4. To examine whether the growth of air passenger traffic and GDP has a cointegrating relationship.

4.2 Nature of Data

In this study, the researcher analyses 33 years of time-series data collected from the World Bank depository for analysis. Time series data analysis with the help of Gretl, an open-source time series data analysis software is used for this purpose.

4.3 Summary Statistics

Summary statistics are information about the sample data. This is useful data and it helps well in analyzing large amounts of data. “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.” Here the values are calculated from sample data. Summary statistics helps to understand better values, “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.” it can help in analyzing the data better. These are values that are calculated based on the sample. summary statistics is a part of descriptive statistics. It summarizes and provides information on a sample of data. Mean, Median, minimum, maximum, SD, CV, Skewness, and kurtosis are displayed under these statistics.

Table 3.1

Summary Statistics

Statistics	GDP in Crores	APT in '000	Air Cargo	GNP p/c
Mean	99646	1697.3	2714.7	6807.7
Median	67752	1337.8	1733.8	5810
Minimum	19591	6.9202	736.5	1710
Maximum	229250	5630.3	6845.2	15190
SD	66631.0	1842.7	2077.7	4451.5
CV	0.7	1.1	0.8	0.7
Skewness	0.5	0.5	0.7	0.3
kurtosis	-1.2	-1.2	-0.8	-1.4

Source: Secondary Data

Table 3.1 shows a summary of GDP, APT, Air Cargo, and GNP. GDP stands for Gross Domestic Product and APT stands for Airline Passenger Traffic, GNI stands for Gross National Product and Air Cargo.

Mean

The mean is a part of the measures of central tendency. The mean is the average of a group of values. Mean statistics show that the values of GDP show crore figures, Air Passenger Traffic is ‘000 crore figures, Air Cargo is shown ‘000 values and GNP is shown ‘000 figures. The Mean GDP is 99646 crore, Air Passenger Traffic is 1697.3, Air Cargo 2714.7 and GNP is 6807.7

Median

A median is defined as the middle value of a group of numbers or data. Median statistics show that the values of GDP show crore figures Air Passenger Traffic is '000 figures, Air Cargo is showing '000 values and GNP shows '000 figures. The Median GDP is 67752 crore, Air Passenger Traffic is 1337.8, Air Cargo is 1733.8 and GNP is 5810.

Minimum

The minimum is the lowest or smallest amount possible or acceptable. Minimum statistics show that the values of GDP show crore figures Air Passenger Traffic is '000 figures, Air Cargo shows '000 values, and GNP shows '000 figures. The minimum GDP is 19591 crore, Air Passenger Traffic is 6.9202, Air Cargo is 736.5 and GNP is 1710.

Maximum

“The maximum value in a set of values, excluding any outliers”. Maximum GDP is 229250 crore, Air Passenger Traffic is 5630.3, Air Cargo 6845.2 and GNP is 15190.

Standard Deviation (SD).

“The standard deviation indicates a “typical” deviation from the mean”. SD of GDP is 66631.0 crore, Air Passenger Traffic is 1842.7, Air cargo is 2077.7 and GNP is 4451.5.

Coefficient of Variation (CV)

“The coefficient of variation (CV) is the ratio of the standard deviation to the mean”. CV of GDP is 0.7, Air Passenger Traffic is 1.1, Air Cargo is 0,8 and GNP is 0.7.

Skewness

“Skewness is a measurement of the distortion of symmetrical distribution or asymmetry in a data set”. SK of GDP is 0.5, Air Passenger Traffic is 0.5, Air Cargo is 0.7 and GNP is 0.3.

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 -1.2, Air Passenger Traffic is -1.2, Air Cargo is -0,8, and GNP is-1.4.

4.4 Data Analysis

The present analysis is conducted to examine the relationship between airline industry growth and the growth of economic indicators like GDP and GNP. The study has mainly three parts: Trend Analysis, Correlation Analysis, and Regression Analysis.

4.4.1 Trend Analysis

Trend analysis is a technique used to examine and predict trends. Editing and examination are done with current and historical data. By comparing data over a specific period, Trend analysis is carried out in the following dimensions:

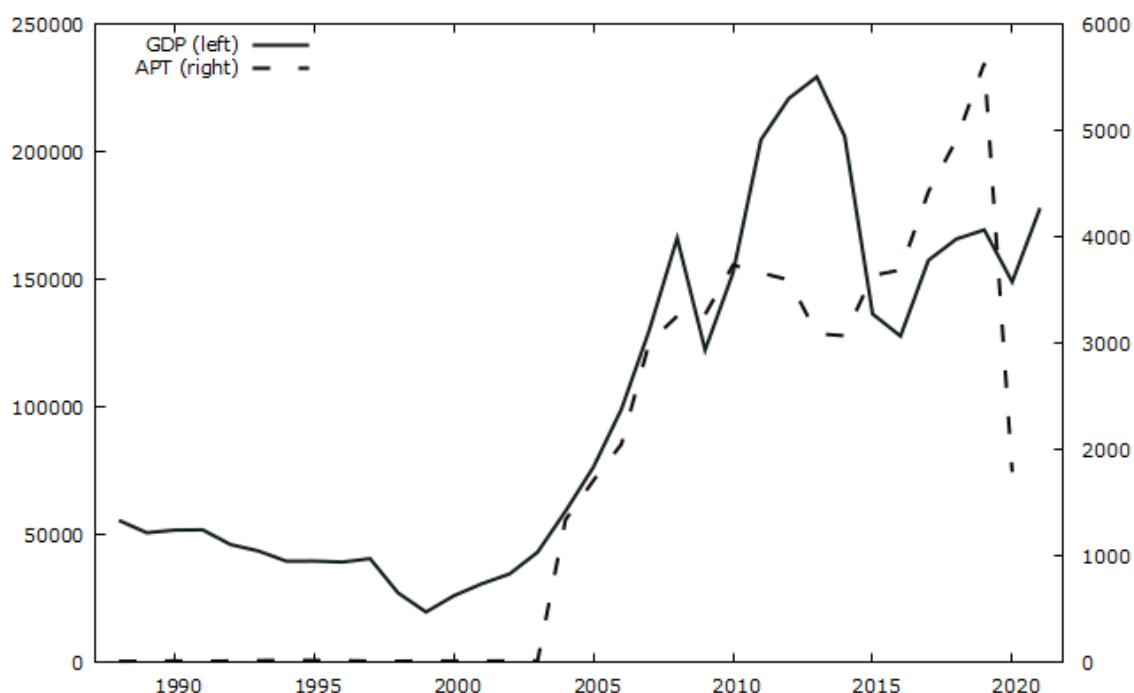
1. Growth Trend of GDP and Air Passenger Traffic
2. Growth Trend of GNP and Air Passenger Traffic
3. Growth Trend of GDP and Air Cargo
4. Growth Trend of GNP and Air Cargo
5. Growth Trend of Air Passenger Traffic and Air Cargo

4.4.1.1 Growth Trend of GDP and Air Passenger Traffic

A time series plot is used to evaluate the growth trend of the GDP of Russia with its growth of air passenger traffic. Figure 4.1 shows the trend of the GDP of Russia with Air passenger traffic carried for the period of the analysis.

Figure 4.1

Time trend – GDP and Air Passenger Traffic



Source: Secondary Data, drawn as Gretl Procedure

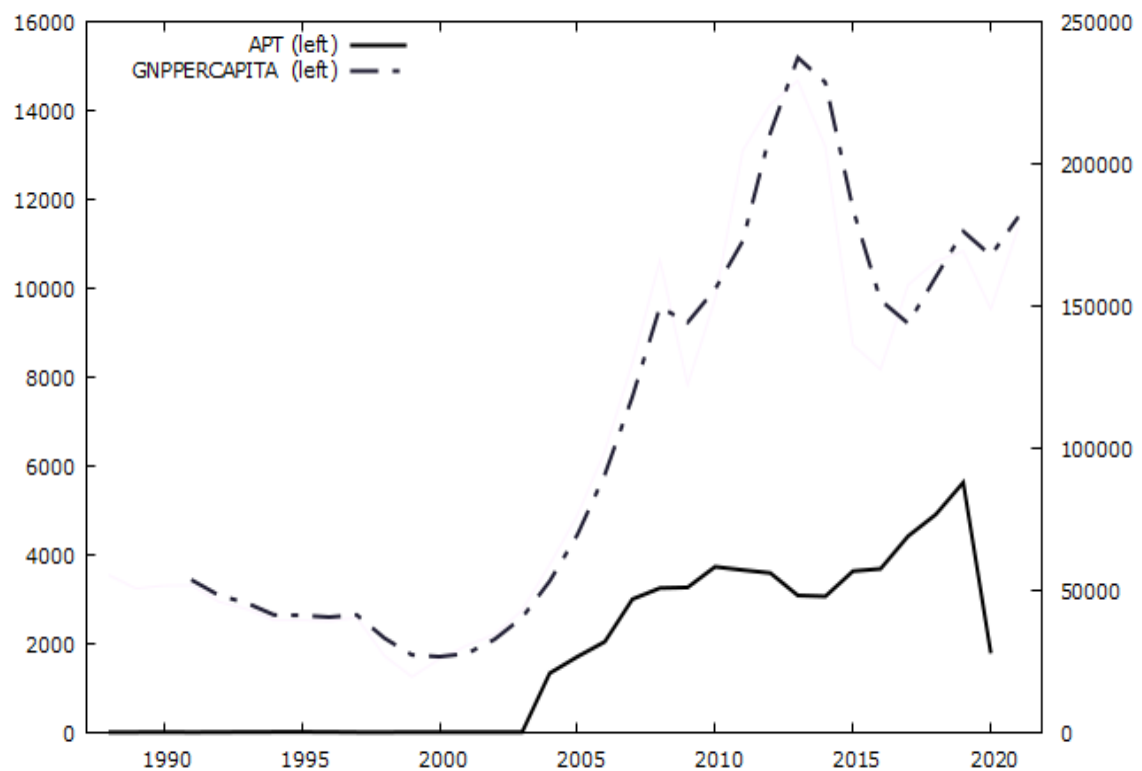
The above figure shows the comparison of the movement of GDP and Air passenger traffic in Russia from 1988 to 2021. The X-axis shows the years from 1988 to 2021 the Y-axis shows the data related to GDP and Air passenger Traffic. The thick line indicates the trend of GDP and the dotted line indicates the trend of Air passenger Traffic. Air passenger traffic showed an almost linear trend until 2003. After 2003, a steep rise is shown till 2007. The growth of GDP also shows a short increase after 2003. from 2006 to 2009 the GDP growth has been declining but no such decline has been shown in the airline group during this period. Since 2009 GDP shows a high growth rate in 2012. but air passenger traffic has not grown proportionately during this period. Airline traffic has shown growth at a higher rate than GDP growth since 2015. The decline of 2020 GDP and air passenger traffic will be lower due to the traffic restrictions caused by Covid. “The change in the behavior of passengers following the covid 19 crisis, travel restrictions, and the ensuing economic crisis has resulted in a dramatic drop in demand for airline services”.

4.4.1.2 Growth Trend of GNP and Air Passenger Traffic

A Time series plot is used to evaluate the growth trend of the GNP of Russia with its growth of Air Passenger Traffic. Figure 4.2 shows the trend of GNP of Russia with Air passenger traffic carried for the period of the analysis.

Figure 4.2

Time trend – GNP and Air Passenger Traffic



Source: Secondary Data, drawn as Gretl Procedure

The above figure shows the comparison of the movement of GNP and Air passenger traffic in Russia from 1988 to 2021. X-axis shows the years from 1988 to 2021 and Y-axis shows the data related to GNP and Air passenger Traffic. The thick line indicates the trend of Air Passenger Traffic and the dotted line indicates the trend of GNP. From 1988 to 2007, air passenger traffic shows an almost straight-line trend. Growth of GNP till 2000 is downward but airline passenger traffic does not show any such growth during this period. From 2000 to 2015, the rate of GNP increased substantially. But air passenger has not grown proportionately during this period.

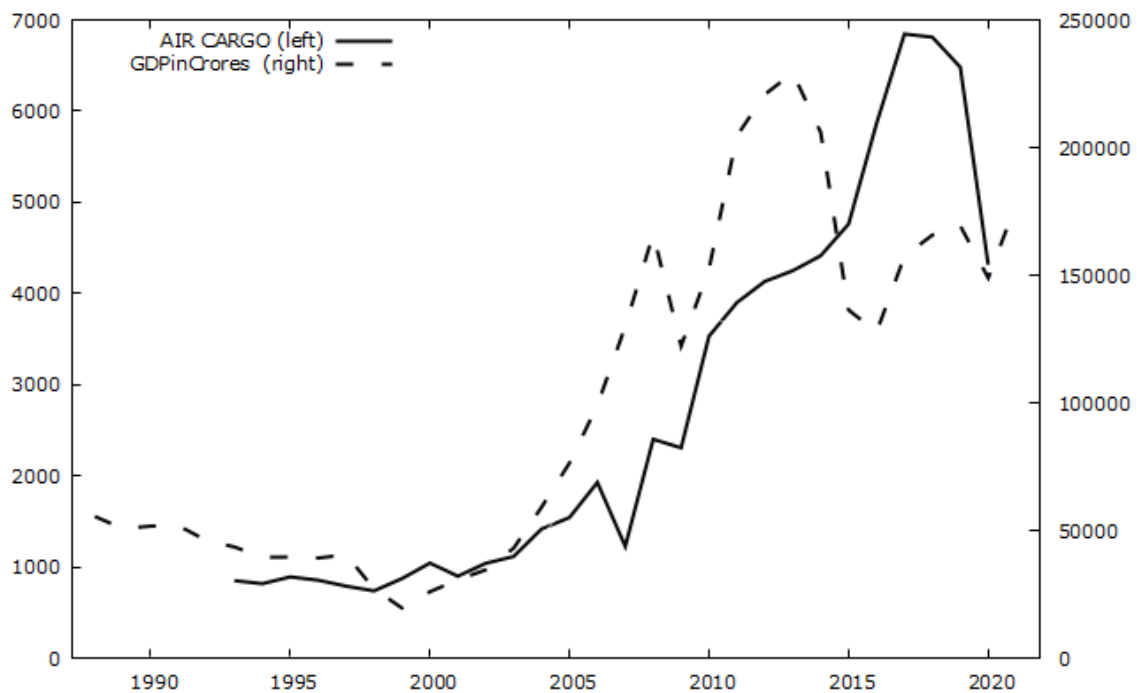
Since 2015, GNP has shown growth at a higher rate than air passenger traffic growth. GNP declined sharply from 2013 to 2015 which has not affected the growth of APT. The growth of Air Passenger Traffic in 2021 is lower due to the traffic control due to the covid 19 pandemic situation, the rate of passenger traffic has decreased.

4.4.1.3 Growth Trend of GDP and Air Cargo

A Time series plot is used to evaluate the growth trend of the GDP of Russia with its growth of Air Cargo. Figure 4.3 shows the trend of the GDP of Russia with Air Cargo carried for the period of the analysis

Figure 4.3

Time trend – GDP and Air Cargo



Source: Secondary Data, drawn as Gretl Procedure

Figure 3.4 shows the relationship between GDP and Air Cargo. X-axis shows the years from 1988 to 2021 and the Y-axis shows the data related to GDP and Air Cargo. The thick line indicates the trend of Air Cargo and the dotted line indicates the trend of GDP. The growth of GDP starts in 1988. An almost straight-line trend

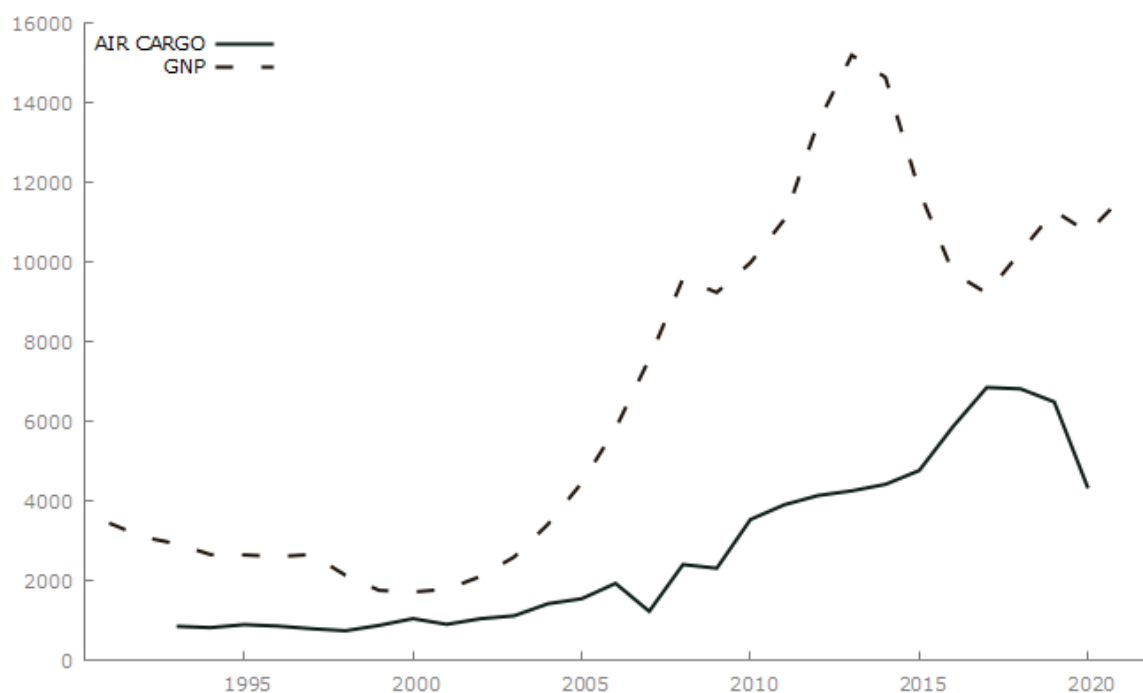
is shown in GDP till 1998. The growth of air cargo starts in 1988. but air cargo has not shown such a decline during this period. from 2000 GDP growth has picked up sharply but Air Cargo has not grown during this period. Since 2015, air cargo rates have shown growth at a higher rate than GDP growth. Cargo increases from 2000 to 2013, but the growth of air cargo suddenly declined in 2020, due to covid pandemic.

4.4.1.4 Growth Trend of GNP and Air Cargo

A Time series plot is used to evaluate the growth trend of the GNP of Russia with its growth of Air Cargo. Figure 4.4 shows the trend of GNP of Russia with Air Cargo carried for the period of the analysis

Figure 4.4

Time trend – GNP and Air Cargo



Source: Secondary Data, drawn as Gretl Procedure

Figure 3.4 shows the relationship between GNP and Air Cargo. X-axis shows the years from 1988 to 2021 and Y axis shows the data related to GNP and Air Cargo. The thick line indicates the trend of Air Cargo and the dotted line indicates the trend

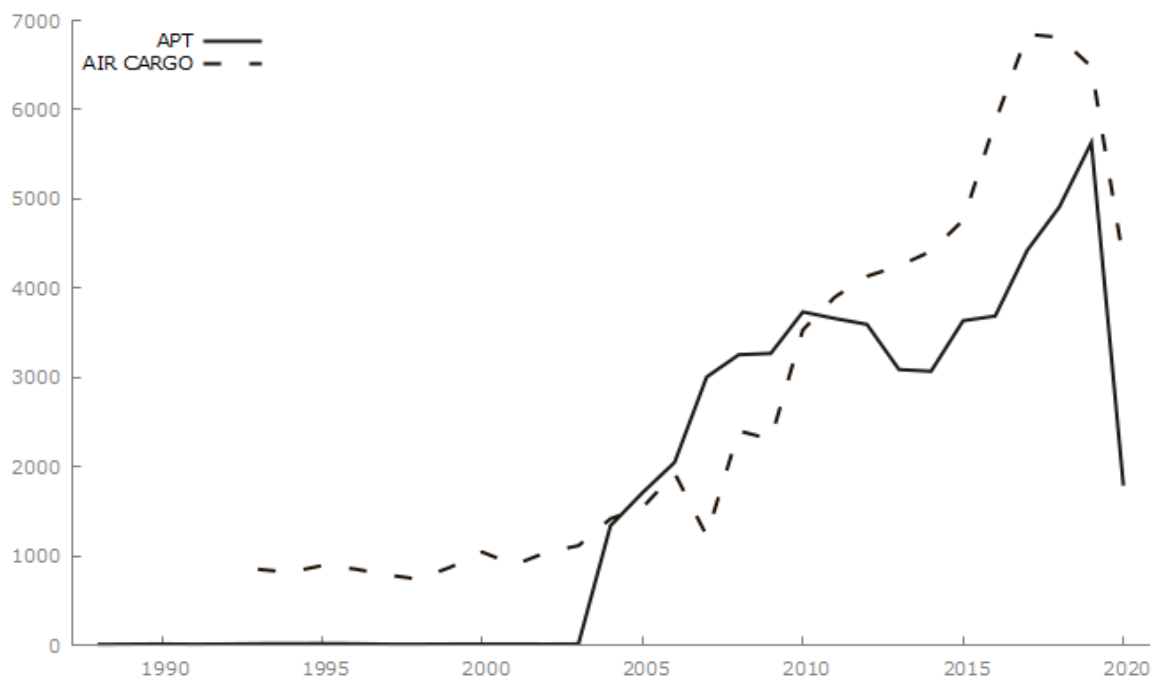
of GNP. From 1993 to 2007, air cargo shows an increased trend. Since 1988, the rate of GNP has shown air cargo at a higher rate. Since 2000, the rate of GNP has increased substantially but air passenger traffic has not grown proportionately during this period. The trend shows that air cargo growth has increased since 2007 but not above the growth of GNP. In 2013, the GNP value decreased but was higher than air cargo. The growth of air cargo in 2021 is downward due to traffic control. “the change in the behavior of passengers following the covid 19 crisis, travel restrictions, and the ensuing economic crisis have resulted in a dramatic drop in demand for airline services”.

4.4.1.5 Growth Trend of Air Passenger Traffic and Air Cargo

A Time series plot is used to evaluate the growth trend of Air Passenger Traffic in Russia with its growth of Air Cargo. Figure 4.5 shows the trend of Air Passenger Traffic in Russia with Air Cargo carried for the period of the analysis.

Figure 4.5

Time trend – Air Passenger Traffic and Air Cargo



Source: Secondary Data, drawn as Gretl Procedure

Figure 3.4 shows the relationship between Air Passenger Traffic and Air Cargo. X-axis shows the years from 1988 to 2021 and Y axis shows the data related to Air Passenger Traffic and Air Cargo. The thick line indicates the trend of Air Passenger Traffic and the dotted line indicates the trend of Air Cargo. Air passenger traffic shows a straight-line trend from 1988 to 2003. Since 1998, the growth trend of air cargo has been higher than that of air passenger traffic. Air passenger traffic shows an upward trend from 2003 to 2009. Since 2009, air cargo growth has shown a trend of higher growth than air passenger traffic growth. Since 2010, air passenger traffic has been increasing slowly. During this period, the trend shows that the rate of air cargo is higher. The growth of air cargo and air passenger traffic in 2021 is downward. The reason for the decrease in air passenger traffic and air cargo rate is the traffic control due to the covid 19 pandemic situation which has reduced the rate of passenger traffic and due to this, the rate of air cargo has also been affected.

4.4.2 Correlation Analysis

Correlation analysis was carried out in the following dimensions:

1. Growth Trend of GDP and Air Passenger Traffic.
2. Growth Trend of GNP and Air Passenger Traffic.
3. Growth Trend of GDP and Air Cargo.
4. Growth Trend of GNP and Air Cargo.
5. Growth Trend of Air Passenger Traffic and Air Cargo.

“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”.

4.4.2.1 GDP Vs Air passenger traffic: Correlation Analysis

Literature review says that the industrial growth of a nation moves in the same direction as its GDP. Hence to examine the relationship between the GDP of Russia and its Air passenger Traffic:

H₀₁ The Growth of the Airline industry of GDP in Russia is not correlated with the growth of its Air Passenger Traffic.

Spearman's rank correlation coefficient (ρ), is used to analyze the correlation between the two variables. The following table 4.2 shows the calculation of rank for the correlation analysis.

Table 4.2

Ranks Assigned: GDP-APT

Year	GDP _{in}		APT _{in} '000	rank
	Cr	rank		
1988	55471.3	18	6.92019	33
1989	50650	21	9.10125	30
1990	51681.4	20	11.6353	23
1991	51796.3	19	8.56281	32
1992	46029.1	22	10.675	27
1993	43508.4	23	14.3111	20
1994	39507.7	27	15.4209	19
1995	39553.7	26	15.9746	18
1996	39172.5	28	14.0956	21
1997	40492.9	25	9.31301	29
1998	27095.5	31	8.7049	31
1999	19590.7	33	10.7203	26
2000	25971	32	11.2874	25
2001	30660.2	30	11.5363	24
2002	34547	29	10.1691	28
2003	43034.8	24	12.1948	22
2004	59101.7	17	1337.78	17

2005	76401.7	16	1707.71	16
2006	98993.1	15	2047.47	14
2007	129971	12	3003.87	13
2008	166085	6	3253.42	10
2009	122264	14	3268.02	9
2010	152492	9	3733.25	4
2011	204593	4	3659.21	6
2012	220830	2	3593.31	8
2013	229247	1	3087.14	11
2014	205924	3	3067.72	12
2015	136348	11	3634.6	7
2016	127679	13	3686.94	5
2017	157420	8	4423.25	3
2018	165733	7	4908.23	2
2019	169311	5	5630.29	1
2020	148936	10	1786.41	15

Source: Secondary Data, Gretl Output

This table shows the rank correlation analysis between GDP and Air passenger traffic. The first rank of GDP is in 2013 and the last rank is in 1999. The first rank of APT is in 2019 and the last rank is in 1988. The rank of GDP and APT is going at a high rate. There is a relationship between the economic indicators of a country and the industrial growth of that country.

Table 4.3 shows the test results correlation analysis.

Table 4.3

Test Results: GDP & APT

		coefficient		P		
Variables		(rho)	t	Value	Sig	Decision
GDP	APT	0.78108289	6.9646	0.001	<0.05	Reject H ₀

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. It is concluded that the GDP of Russia is significantly not correlated with the Growth of its airline industry represented by Air Passenger Traffic (APT). The null hypothesis is rejected.

4.4.2.2 GNP Vs APT Rank Correlations

Literature review says that the industrial growth of a nation moves in the same direction as its GNP. Hence to examine the relationship between the GNP of Russia and its Air Passenger Traffic:

H₀₂ The Growth of the Airline industry of GNP in Russia is not correlated with the growth of its Air Passenger Traffic.

Spearman's rank correlation coefficient (rho), is used to analyze the correlation between the two variables. The following table 4.4 shows the calculation of rank for the correlation analysis.

Table 4.4

Ranks Assigned: GNP-APT

Year	GNP in	Rank	APT in' 000	Rank
1991	3440	17	8.56281	30
1992	3090	19	10.675	26
1993	2920	20	14.3111	20
1994	2650	21.5	15.4209	19
1995	2640	23	15.9746	18
1996	2600	24	14.0956	21
1997	2650	21.5	9.31301	28
1998	2130	26	8.7049	29
1999	1750	29	10.7203	25
2000	1710	30	11.2874	24
2001	1780	28	11.5363	23
2002	2100	27	10.1691	27
2003	2590	25	12.1948	22

2004	3410	18	1337.78	17
2005	4450	16	1707.71	16
2006	5810	15	2047.47	14
2007	7560	14	3003.87	13
2008	9580	11	3253.42	10
2009	9230	12	3268.02	9
2010	9980	9	3733.25	4
2011	11060	6	3659.21	6
2012	13490	3	3593.31	8
2013	15190	1	3087.14	11
2014	14630	2	3067.72	12
2015	11780	4	3634.6	7
2016	9730	10	3686.94	5
2017	9210	13	4423.25	3
2018	10250	8	4908.23	2
2019	11280	5	5630.29	1
2020	10740	7	1786.41	15

Source: Secondary Data, Gretl Output

This table shows the rank correlation analysis between GNP and Air passenger traffic. The first rank of GNP is in 2013 and the last rank is in 2000. The first rank of APT is in 2019 and the last rank is in 1991. The rank of GNP and APT is going at a high rate. There is a relationship between the economic indicators of a country and the industrial growth of that country

Table 4.5 show the test results correlation analysis.

Table 4.5

Test Results: GNP & APT

		coefficient		P		
Variables		(rho)	t	Value	Sig	Decision
GNP	APT	0.79786406	7.00338	0.01	<0.05	Reject H ₀

Source: Secondary Data, Gretl Output

Spearman's rank correlation coefficient (ρ)

two-tailed p-value.

The P value of the test result is less than 0.05. It is concluded that the GNP of Russia is significantly not correlated with the Growth of its airline industry represented by Air Passenger Traffic (APT). Hence the hypothesis is rejected in this analysis.

4.4.2.3 GDP Vs Air Cargo: Correlation Analysis

Literature review says that the industrial growth of a nation moves in the same direction as its GDP. Hence to examine the relationship between the GDP of Russia and its Air Cargo:

H₀₃ The Growth of the Airline industry of GDP in Russia is
not correlated with the growth of its air cargo.

Spearman's rank correlation coefficient (ρ), is used to analyze the correlation between the two variables. The following table 4.6 shows the calculation of rank for the correlation analysis.

Table 4.6

Ranks Assigned: GDP-Air Cargo

Year	GDP Crores	in Rank	Air Cargo	Rank
1993	43508.4	18	848.7	25
1994	39507.7	22	815.4	26
1995	39553.7	21	890.1	22
1996	39172.5	23	853.6	24
1997	40492.9	20	788.3	27
1998	27095.5	26	736.5	28
1999	19590.7	28	871.8	23
2000	25971	27	1041.41	19
2001	30660.2	25	897.637	21
2002	34547	24	1039.06	20

2003	43034.8	19	1113.38	18
2004	59101.7	17	1415.79	16
2005	76401.7	16	1541.22	15
2006	98993.1	15	1926.3	14
2007	129971	12	1224.31	17
2008	166085	6	2399.59	12
2009	122264	14	2305.55	13
2010	152492	9	3531.58	11
2011	204593	4	3900.12	10
2012	220830	2	4132.14	9
2013	229247	1	4249.27	8
2014	205924	3	4413.56	6
2015	136348	11	4761.05	5
2016	127679	13	5863.2	4
2017	157420	8	6845.23	1
2018	165733	7	6810.61	2
2019	169311	5	6481	3
2020	148936	10	4314.6	7

Source: Secondary Data, Gretl Output

This table shows the rank correlation analysis between GDP and Air Cargo. The first rank of GDP is in 2013 and the last rank is in 1999. The first rank of AC is in 2017 and the last rank is in 1998. The rank of GDP and AC is going at a high rate. There is a relationship between the economic indicators of a country and the industrial growth of that country.

Table 4.7 show the test results correlation analysis.

Table 4.7

Test Results: GDP & Air Cargo

		coefficient		P		
Variables		(rho)	t	Value	Sig	Decision
						Reject
GDP	AC	0.79786406	7.00338	0.001	<0.05	H ₀₃

Source: Secondary Data, Gretl Output

Spearman's rank correlation coefficient (rho)

two-tailed p-value

¹ The null hypothesis is rejected because the P value of the test result is less than 0.05.

It is concluded that the GDP of Russia is significantly not correlated with the Growth of its airline industry represented by Air Cargo.

4.4.2.4 GNP Vs Air Cargo: Correlation Analysis

Literature review says that the industrial growth of a nation moves in the same direction as its GNP. Hence to examine the relationship between the GNP of Russia and its Air Cargo, the following hypotheses are formed:

H₀₄ The Growth of the Airline industry of GNP of Russia is not correlated with the growth of its air cargo.

Spearman's rank correlation coefficient (rho), is used to analyze the correlation between the two variables. The following table 4.8 shows the calculation of rank for the correlation analysis.

Table 4.8**Ranks Assigned: GNP-Air Cargo**

Year	GNP	Rank	Air Cargo	Rank
1993	2920	18	848.7	25
1994	2650	19.5	815.4	26
1995	2640	21	890.1	22
1996	2600	22	853.6	24
1997	2650	19.5	788.3	27
1998	2130	24	736.5	28
1999	1750	27	871.8	23
2000	1710	28	1041.41	19
2001	1780	26	897.637	21
2002	2100	25	1039.06	20
2003	2590	23	1113.38	18
2004	3410	17	1415.79	16
2005	4450	16	1541.22	15
2006	5810	15	1926.3	14
2007	7560	14	1224.31	17
2008	9580	11	2399.59	12
2009	9230	12	2305.55	13
2010	9980	9	3531.58	11
2011	11060	6	3900.12	10
2012	13490	3	4132.14	9
2013	15190	1	4249.27	8
2014	14630	2	4413.56	6
2015	11780	4	4761.05	5
2016	9730	10	5863.2	4
2017	9210	13	6845.23	1
2018	10250	8	6810.61	2
2019	11280	5	6481	3
2022	10740	7	4314.6	7

Source: Secondary Data, Gretl Output.

This table shows the rank correlation analysis between GNP and Air Cargo. The first rank of GNP is in 2013 and the last rank is in 2000. The first rank of AC is in 2017 and the last rank is in 1998. The rank of GNP and AC is going at a high rate. There is a relationship between the economic indicators of a country and the industrial growth of that country.

Table 4.9 show the test results correlation analysis.

Table 4.9

Test Results: GNP & Air Cargo

		coefficient		P		
Variables		(rho)	t	Value	Sig	Decision
						Reject
GNP	AC	0.80936089	7.02684	0.01	<0.05	H ₀₄

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. Hence the null hypothesis H₀₄ is rejected. It is concluded that the GNP of Russia is significantly not correlated with the Growth of its airline industry represented by Air Cargo.

4.4.2.5 Air Passenger Traffic Vs Air Cargo Rank Correlation

Air Passenger Traffic and Air Cargo Spearman's rank correlation analysis is carried out to examine the relationship between Air Passenger Traffic and Air Cargo of the nation Russia to test the statistical significance of the correlation the following null hypothesis is formulated.

H₀₅ The Growth of Air Passenger traffic in Russia is not correlated with the growth of its air cargo.

Spearman's rank correlation coefficient (ρ), is used to analyze the correlation between the two variables. The following table 4.10 shows the calculation of rank for the correlation analysis.

Table 4.10

Ranks Assigned: Air Passenger Traffic and Air Cargo

Year	APTin 000	Rank	Air Cargo	Rank
1993	14.3111	20	848.7	25
1994	15.4209	19	815.4	26
1995	15.9746	18	890.1	22
1996	14.0956	21	853.6	24
1997	9.31301	27	788.3	27
1998	8.7049	28	736.5	28
1999	10.7203	25	871.8	23
2000	11.2874	24	1041.41	19
2001	11.5363	23	897.637	21
2002	10.1691	26	1039.06	20
2003	12.1948	22	1113.38	18
2004	1337.78	17	1415.79	16
2005	1707.71	16	1541.22	15
2006	2047.47	14	1926.3	14
2007	3003.87	13	1224.31	17
2008	3253.42	10	2399.59	12
2009	3268.02	9	2305.55	13
2010	3733.25	4	3531.58	11
2011	3659.21	6	3900.12	10
2012	3593.31	8	4132.14	9
2013	3087.14	11	4249.27	8
2014	3067.72	12	4413.56	6
2015	3634.6	7	4761.05	5
2016	3686.94	5	5863.2	4
2017	4423.25	3	6845.23	1
2018	4908.23	2	6810.61	2
2019	5630.29	1	6481	3
2020	1786.41	15	4314.6	7

Source: Secondary Data, Gretl Output

This table shows the rank correlation analysis between APT and Air Cargo. The first rank of APT is in 2019 and the last rank is in 1998. The first rank of AC is in 2017 and the last rank is in 1998. The rank of APT and AC is going at a high rate. There is a relationship between the economic indicators of a country and the industrial growth of that country.

Table 4.11 show the test results correlation analysis.

Table 4.11

Test Results: APT & Air Cargo

		coefficient		P		
Variables		(rho)	t	Value	Sig	Decision
						Reject
APT	AC	0.8877942	9.8359	0.01	<0.05	H03

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_0 is rejected and it is concluded Air Passenger Traffic (APT) that Russia is significantly correlated with the Growth of its airline industry represented by Air Cargo.

4.4.2.6 Cointegration Analysis

The Engle-Granger cointegration test is a common statistical tool used in time series data analysis. It is commonly called EGC Test. It is used to establish the long-run relationship between two-time series data. Here the researcher intends to check whether there is a long-run cointegrated relationship between the GDP and Air Passenger Traffic. The following hypothesis is formulated:

H₁1 The Growth of Air Passenger traffic in Russia and GDP shows a cointegrated relationship.

Figure 4.1 shows the time trend of Air passenger traffic and GDP. As per the figure, both the data show almost an equal trend. To examine whether the alternative hypothesis is true, an EGC test is conducted. EGC test assumes stationary data. For this ADF Unit root is conducted. Lag selection is the primary step of the ADF unit root test. Test results are given in 4.12

Table 4.12
Lag Selection for ADF Unit Root Test

lags	loglik	p(LR)	AIC	BIC	HQC
1	-451.01724		39.740629	40.036845	39.815127
2	-448.80603	0.35185	39.896177	40.389870	40.020339
3	-447.63958	0.67479	40.142573	40.833743	40.316400
4	-442.75362	0.04445	40.065532	40.954180	40.289025
5	-436.04629	0.00942	39.830112	40.916237	40.103270
6	-420.51895	0.00000	38.827735	40.111337	39.150557
7	-407.22217	0.00002	38.019319	39.500398	38.391806
8	-398.50003	0.00158	37.608698	39.287255	38.030851
9	-346.96389	0.00000	33.475120	35.351154	33.946938
10	-320.50598	0.00000	31.522259*	33.595770*	32.043741*

Source: Gretl output

As per Table 4.12, Akaike criterion(AIC), Bayesian criterion (BIS), and Hannan-Quinn criterion (HQC) criteria favor Lag 10. Test results of the ADF Unit root test are given below:

Step 2: Augmented Dickey-Fuller test for GDP in Crores

testing down from 10 lags, criterion AIC

sample size 26

unit-root null hypothesis: $a = 1$

test with constant including 6 lags of $(1-L)GDP$ in Crores

model: $(1-L)y = b_0 + (a-1)*y(-1) + \dots + e$

the estimated value of $(a - 1)$: -0.173126

test statistic: $\tau_c(1) = -2.25153$

asymptotic p-value 0.1882

1st-order autocorrelation coeff. for e : -0.023

lagged differences: $F(6, 18) = 2.330$ [0.0767]

³ Since the P value is greater than 0.05, the unit root null hypothesis is accepted.

The unit-root hypothesis is not rejected for the individual variable GDP.

Step 3: testing for a unit root in APTin1000

Augmented Dickey-Fuller test for APTin1000

testing down from 10 lags, criterion AIC, sample size 32

unit-root null hypothesis: $a = 1$

test with constant

including 0 lags of $(1-L)$ APT in 1000

model: $(1-L)y = b_0 + (a-1)*y(-1) + e$

the estimated value of $(a - 1)$: -0.104497

test statistic: $\tau_c(1) = -1.38397$

asymptotic p-value 0.5918

1st-order autocorrelation coeff. for e : -0.035

Since P value is greater than 0.05, accepted. The unit-root hypothesis is not rejected for the individual variable APT.

Step: 4 Cointegrating Regression

OLS, using observations 1988-2020 (T = 33)

Dependent variable: GDP in Crores

Table 4.13

OLS Regression Results

	coefficient	std. error	t-ratio	p-value	Significance
const	43422.7	7514.53	5.778	2.31e-06	***
APTin1000	31.7295	3.02442	10.49	1.01e-011	***

Source: Gretl output.

As per Table 4.13, there exists a statistically significant relationship between GDP and APT.

Step: 5 Testing for a unit root in uhat

Augmented Dickey-Fuller test for uhat

testing down from 10 lags, criterion AIC, sample size 22

unit-root null hypothesis: $\alpha = 1$

test without constant

including 10 lags of $(1-L)uhat$

model: $(1-L)y = (\alpha - 1)y(-1) + \dots + e$

the estimated value of $(\alpha - 1)$: -1.12333

test statistic: $\tau_c(2) = -1.69593$

asymptotic p-value 0.6801

1st-order autocorrelation coeff. for e: -0.287

lagged differences: $F(10, 11) = 3.339$ [0.0301]

Since P value is greater than 0.05, and hence null hypothesis is accepted. The unit-root hypothesis is not rejected for the individual variables GDP and APT.

Cointegration Result

As per EGC criteria, “there is evidence for a cointegrating relationship if:

- (a) The unit-root hypothesis is not rejected for the individual variables,
- (b) If regression results are significant, and
- (c) the unit-root hypothesis is rejected for the residuals (uhat) from the cointegrating regression.”

The Engle-Granger cointegration test result shows that the first two criteria of cointegration relationships are satisfied. But the test results satisfied the third criterion. Hence it is concluded that there exists no cointegrated relationship between GDP and APT. Therefore the alternative hypothesis is rejected.

4.5 Conclusion.

According to correlation and trend analysis, there is a correlation between the Russian civil aviation industry and the growth of GDP, GNP, Air Passenger Traffic, and Air Cargo. The conclusion from this analysis is that there is mostly an increasing trend in GDP, GNI, Air Passenger Traffic, and Air Cargo Russia. The conclusion is that the GDP growth of Russia is significantly not correlated with the growth of its airline industry represented by Air Passenger Traffic and Air Cargo. GNP growth of Russia is significantly not correlated with the growth of its airline industry by Air Passenger Traffic and Air Cargo. Even though there exists a significant relationship between GDP and APT. There is no cointegrated relationship between the two variables.

CHAPTER – 5

FINDINGS, SUGGESTIONS, AND CONCLUSION

5.1 Introduction

There may be a relationship between the economic indicators of a country and the industrial growth of that country. Because 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 Russian airline industry and economic indicators in that country. Data from 1988 to 2021 is available here. Development Indicators Related to the Airline Industry of Russia were collected and used for analysis.

The following objectives were formulated for this purpose;

1. To examine whether the growth of the Airline industry of Russia is correlated with the GDP growth of that nation.
2. To examine whether the growth of the Airline industry of Russia is correlated with the GNP growth of that nation.
3. To examine whether the growth of air passenger traffic in Russia is correlated with the air cargo growth of that nation.
4. To examine whether the growth of air passenger traffic and GDP has a cointegrating relationship.

5.2 Findings

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

5.2.1 Correlation of the Growth of the Airline Industry with the GDP

1. The movement of GDP and Air passenger traffic in Russia from 1988 to 2003, air passenger traffic shows an almost straight-line trend. After 2003, a steep rise is shown till 2007.
2. The growth of GDP also shows a short increase after 2003
3. From 2006 to 2009 the GDP growth has been declining but no such decline has been shown in the airline group during this period.
4. From 2009 GDP shows a high growth rate in 2012.
5. Airline traffic has shown growth at a higher rate than GDP growth since 2015.
6. The decline of GDP and air passenger traffic in 2020 due to the traffic restrictions caused by Covid 19.
7. An almost straight-line trend is shown in GDP till 1998.
8. Since 2000 GDP growth has picked up sharply. Air Cargo has not grown during this period.
9. Since 2015, air cargo rates have shown growth at a higher rate than GDP growth.
10. Cargo increased from 2000 to 2013.
11. The growth of air cargo suddenly declined in 2020, due to covid pandemic.

5.2.2 Correlation of the Growth of the Airline Industry with GNP

12. The movement of GNP and Air passenger traffic in Russia from 1988 to 2021, shows a almost straight-line trend.
13. Growth of GNP till 2000 is downward but airline passenger traffic has almost shown growth during this period.
14. From 2000 to 2015, the rate of GNP increased substantially. But air passenger has not grown proportionately during this period.
15. Since 2015, GNP has shown growth at a higher rate than air passenger traffic growth.

16. GNP decline sharply from 2013 to 2015 which was not effected such growth of APT.
17. The growth of Air Passenger Traffic in 2021 is lower due to the traffic control due to the covid 19 pandemic situation, the rate of passenger traffic has decreased.
18. From 1993 to 2007, air cargo shows an almost linear trend.
19. 1988, the rate of GNP has shown air cargo at a higher rate.
20. The rate of GNP has increased substantially but air passenger traffic has not grown proportionately during this period.
21. Air cargo growth has increased since 2007 but not above the growth of GNP
22. In 2013, the GNP value decreased but was higher than air cargo.
23. The GNP will increase in 2020 and the rate of air cargo will decrease but “the change in the behavior of passengers following the covid 19 crisis, travel restrictions, and the ensuing economic crisis have resulted in a dramatic drop in demand for airline services”.

5.2.3 Correlation of the growth of the airline industry with Air Passenger Traffic and Air Cargo.

24. The movement of GNP and Air passenger traffic in Russia from 1988 to 2021.
25. Air passenger traffic shows a straight-line trend from 1988 to 2003.
26. Since 2009, air cargo rates have shown a trend of higher growth than air passenger traffic growth.
27. The rate of AC has increased substantially but APT has not grown proportionately during this period.
28. The air passenger traffic has been increasing slowly in 2009, The reason for the decrease in air passenger traffic and air cargo rate is the traffic control due to the covid 19 pandemic situation which has reduced the rate of passenger traffic and due to this, the rate of air cargo has also been affected.

5.2.4 Cointegrated Movement of APT and GDP

29. There exists a statistically significant relationship between GDP and APT.

30. There is no cointegrated relationship between the two variables.

5.3 Suggestions

1. Russia belongs to the high-income group. Macro analysis shows that there is no relationship between the GDP and GNP of Russia 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 industry growth with economic indicators.

Theoretical Implications

The study has established the existing literature on the relationship between industrial -economic indicators. The study reveals that even though there exists a significant positive correlation between economic indicators and aviation industries, it may not lead to a co-integrated relationship .so the study provides a way to predict the growth of the aviation industry from the economic indicators to a great extent.

5.4 Conclusion

According to correlation and trend analysis, there is no correlation between Russia's civil aviation industry and the growth of GDP. The growth of GNP and the civil aviation industry has been not correlated by correlation and trend analysis. There is a relationship between the economic indicators of a country and the industrial growth of that country. Because the economic indicators indicate the overall progress of the country.

BIBLIOGRAPHY

- Ajmair M. (2014). European Journal of Contemporary Economics and Management May 2014 Edition Vol.1 No.1106I. *IMPACT OF INDUSTRIAL SECTOR ON GDP (PAKISTAN CASE)*.
<http://docplayer.net/34425795-Impact-of-industrial-sector-on-gdp-pakistan-case.html>
- CEIC. (2022). *Russia Real GDP Growth*. CEIC.
<https://www.ceicdata.com/en/indicator/russia/real-gdp-growth>
- Coursehero. (2022). *About Aero Aviation*. Greece--Value-of-Aviation.
<https://www.coursehero.com/file/143776697/greece-value-of-aviationpdf/>
- Dube, K., Nhamo, G., & Chikodzi, D. (2021b). COVID-19 pandemic and prospects for recovery of the global aviation industry. *Journal of Air Transport Management*, 92, 102022. <https://doi.org/10.1016/j.jairtraman.2021.102022>
- Erdil, S. T., & Yildiz, O. (2011a). Measuring service quality and a comparative analysis in the passenger carriage of airline industry. *Procedia - Social and Behavioral Sciences*, 24, 1232–1242.
<https://doi.org/10.1016/j.sbspro.2011.09.117>
- Erdil, S. T., & Yildiz, O. (2011b). Measuring service quality and a comparative analysis in the passenger carriage of airline industry. *Procedia - Social and Behavioral Sciences*, 24, 1232–1242.
<https://doi.org/10.1016/j.sbspro.2011.09.117>
- fetiz, filiz ozden, C. (2017). Analysis of Causal Relationship Among Gdp, Agricultural, Industrial and Services Sector Growth in Turkey. *Ömer Halisdemir Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 10(3), 75–84. <https://doi.org/10.25287/ohuiibf.305729>
- IATA. (2018). *The importance of air transport to the Russian Federation*.
<https://www.iata.org/en/iata-repository/publications/economic-reports/russian->

federation--value-of-aviation/

- 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
- P. Neverov, N. Pislegina, S. L. & S. S. B. (2013). The analysis of problems and development prospects of civil aviation in Russia. *Paper Knowledge . Toward a Media History of Documents*, 12–26.
- 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
- Salarzadeh Jenatabadi, H., Huang, H., Ismail, N. A., Satar, N. B. M., & Mohamed Radzi, C. W. J. bt W. (2013). Impact of Economic Performance in Organizational Capacity, Capability: A Case Study in Airline Industry. *International Journal of Business and Management*, 8(17), 112–120. <https://doi.org/10.5539/ijbm.v8n17p112>
- Schmeleva, A. N., & Bezdelov, S. A. (2020). Problems and mechanisms to improve the Russian aviation industry's productivity in the sharing economy. *IOP Conference Series: Materials Science and Engineering*, 1001(1). <https://doi.org/10.1088/1757-899X/1001/1/012026>
- Stephens, M. S., Ikeogu, V., Stephens, O. B., & Ukpere, W. I. (2014). *Empirical Analysis of the Contribution of the Aviation Industry to the Nigerian Economy*. 5(3), 115–125. <https://doi.org/10.5901/mjss.2014.v5n3p115>
- The World Bank. (2022). GDP growth (annual %) - Russian Federation. In *The World Bank*. <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=RU>

APPENDIX

Data collected from the world bank

YEAR	GDP in Crores \$	GNP'000	AC millon ton	APT in 1000
1988	554713455150			
1989	506500173960			
1990	516814274022			
1991	517962962963	3440		128760600
1992	460290556901	3090	848.7000122	62173900
1993	435083713851	2920	815.4000244	36124000
1994	395077301248	2650	890.0999756	28933100
1995	395537185735	2640	853.5999756	26524800
1996	391724890744	2600	788.2999878	22117100
1997	404928954192	2650	736.5	20419000
1998	270955486862	2130	871.7999878	15223700
1999	195907128351	1750	1041.409	18600400
2000	259710142197	1710	897.637	17687894
2001	306602070621	1780	1039.064	20301199
2002	345470494418	2100	1113.381	20892156
2003	430347770732	2590	1415.785	22723072
2004	591016690743	3410	1541.219	25948923
2005	764017107992	4450	1926.295	26522315
2006	989930542279	5810	1224.313	28836949
2007	1299705764824	7560	2399.593	33187839
2008	1660846387625	9580	2305.548	37940321
2009	1222644282202	9230	3531.583	34402844
2010	1524917468442	9980	3900.12005	43855539
2011	2045925608274	11060	4132.144	50555805
2012	2208295773643	13490	4249.26882	58727125

2013	2292473246621	15190	4413.55935	64072322
2014	2059241965491	14630	4761.04707	72189961
2015	1363481063447	11780	5863.19654	76846126
2016	1276786979222	9730	6845.22951	77458318
2017	1574199387071	9210	6810.61016	89373638
2018	1657329646184	10250	6480.99978	99327311
2019	1693113904263	11280	4314.60456	108857906
2020	1489362488440	10740	5888.41652	62447448
2021	1778782625794	11610		96851769

Reference

<https://databank.worldbank.org/source/world-development-indicators>

<https://data.worldbank.org/indicator/IS.AIR.PSGR>

<https://data.worldbank.org/indicator/IS.AIR.GOOD.MT.K1>

<https://data.worldbank.org/indicator/NY.GNP.PCAP.CD>

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