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Econometric Modeling of the Impact of the Tourism Sector on Economic Growth within the Framework of Sustainable Development Goals in Saudi Arabia's Vision 2030 (1990 - 2024)

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ABSTRACT

This study aims to analyze the pivotal role of the tourism sector in achieving the Sustainable Development Goals (SDGs) within the framework of Saudi Arabia's Vision 2030. This is accomplished by constructing an econometric model to evaluate the impact of key economic indicators (revenues, investment, and employment) on economic growth and to identify the challenges facing the sector. The results validate the hypothesis of a strong positive correlation between the growth of the tourism sector and economic growth, where the econometric model explains approximately 82% of the variations in Gross Domestic Product (GDP) Furthermore the findings indicate that employment in the tourism sector is the strongest driver of economic growth, exhibiting an elasticity of 2.933% This underscores the pivotal role of tourism in economic diversification and the creation of qualitative job opportunities in both the economic and social dimensions, the econometric analysis demonstrated a strong negative correlation between comprehensive investment and environmental development, serving as a warning that rapid expansion may exacerbate environmental pressures, Additionally, key challenges were identified, including the high cost of tourism programs and low rates of job localization. Based on these results, the study recommends strictly steering tourism investment toward Green Economy practices and intensifying national cadre qualification programs to boost localization rates and maximize the high economic impact of employment. Furthermore, it advises addressing the cost challenge and improving infrastructure and services to ensure regional competitiveness and achieve integrated sustainable development.

Keywords:

sustainable development, tourism sector, tourism investment, localization, green economy.

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1. Introduction

Tourism is one of the leading drivers of economic growth and social development worldwide, far exceeding its role as a mere service activity It has become an integrated industry closely linked to sustainable development concepts. Against the backdrop of global trends, the tourism sector has emerged as a vital tool capable of contributing comprehensively to economic growth, creating decent jobs and enhancing cultural identity while preserving environmental resources for future generations.

Within this context, Saudi Arabia is undergoing an exceptional national transformation led by "Vision 2030" launched in 2016 with the aim of diversifying the country's economic base This vision has strategically prioritized tourism as one of the essential pillars to achieve its goals leveraging the Kingdom's unique competitive assets - including deep religious and cultural heritage, vast natural diversity significant investment capabilities, and a strategic geographic location. To activate this direction, Saudi Arabia has launched a package of ambitious initiatives and major projects such as NEOM, the Red Sea, Qiddiya , Diriyah , and AlUla in addition to developing infrastructure and streamlining visa procedures These efforts aim to raise the bar by attracting 150 million visitors annually and increasing the sector's contribution to GDP to 10% by 2030.

I. Research Problem

The research problem, from an economic perspective, lies in assessing the sustainability and quality of the growth achieved by the tourism sector within Vision 2030. Despite positive quantitative indicators such as increased revenues and tourist numbers, there is a gap in understanding the structural nature of this growth and its long-term effects on the national economy. This problem can be crystallized through the following main questions:

1. **] Diversification:** To what extent does the tourism sector actually contribute to genuine, sustainable economic diversification that reduces structural dependence on oil revenues? Or does its impact remain limited regarding macroeconomic structural change?

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2. **Quality of Employment Opportunities:** What kind of jobs does the sector create? Are they high value-added, sustainable positions for the national workforce, or mainly concentrated in low-wage, seasonal jobs that do not effectively reduce structural unemployment?
3. **Economic Leakage:** What proportion of tourism's financial returns is retained within the local/national economy? What rate of "economic leakage" arises from reliance on foreign investment, imported goods/services, and expatriate remittances, potentially limiting the sector's developmental multiplier effect?

II. Study Significance

1. Scientific Level (Knowledge Contribution):

The strategic importance of tourism lies in its role as a pillar for achieving sustainable development in Saudi Arabia, manifesting in three integrated dimensions:

- **Economically:** The sector is a core generator for diversifying national income, reducing historic oil dependency, directly contributing to GDP growth, and attracting substantial local and foreign investment in infrastructure and support services.
- **Socially:** Tourism represents an effective tool for social development by addressing unemployment through empowering youth and women, reviving national heritage, strengthening cultural identity, and improving local community quality of life.
- **Environmentally:** The literature underscores the necessity to adopt sustainable tourism models that balance growth and resource protection, ensuring the preservation of environmental and heritage assets as foundational attractions for future generations' sustainability.

2. Practical Level (Applications):

The practical significance is the transition from theory to direct econometric application—constructing a model to quantitatively measure tourism's impact on sustainable development dimensions in Saudi Arabia under Vision 2030 using an Autoregressive Distributed Lag (ARDL) approach. This allows for the analysis of independent variable impacts (revenues, employment, etc.) on a dependent indicator (economic growth).

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III. Study Objectives

The study aims to:

1. Analyze the status of Saudi Arabia's tourism sector and its importance as a basic pillar for sustainable development under Vision 2030.
2. Measure the economic impact of key tourism sector indicators (such as revenues and employment volume) on Saudi economic growth via an econometric model.
3. Identify challenges and barriers to the development of tourism activity in Saudi Arabia and propose effective mechanisms to address them.
4. Formulate actionable recommendations based on econometric analysis to strengthen tourism's contribution to achieving sustainable development goals.

IV. Study Hypotheses

Main Hypothesis:

There is a statistically significant positive correlation between tourism sector development and the realization of sustainable development dimensions (economic, social, environmental) in Saudi Arabia under Vision 2030.

Sub-hypotheses:

1. **Economic Dimension:** Growth in the tourism sector (as measured by increased revenues and investment) has a positive and direct impact on economic diversification and growth, reflected in increased non-oil GDP.
2. **Social Dimension:** Domestic/local tourism enhances the social dimensions of sustainable development by raising employment rates, empowering women/youth, developing local communities, and preserving cultural heritage.
3. **Environmental Dimension:** Adopting eco-friendly and sustainable tourism practices, particularly those championed by Vision 2030 (such as the Saudi Green Initiative), positively affects the protection of natural resources and preservation of heritage/eco sites in Saudi Arabia.

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V. Methodology

A mixed-methods approach (qualitative and quantitative) was adopted:

- **Descriptive Method:** To analyze the status of tourism and sustainable development in Saudi Arabia—reviewing literature, official documents, and Vision 2030 policies relevant to tourism and sustainability.
- **Quantitative/Econometric Method:** To empirically test the hypotheses using time-series data for tourism-related variables (revenues, tourist numbers, employment) and sustainable development indicators (GDP contributions, social and environmental metrics).
- **Study Population:** Saudi tourism sector, national policies, and Vision 2030-related development initiatives from 2016 onward.
- **Sample:** Official reports, statistical data, and documents from national bodies (Ministry of Tourism, Saudi Tourism Authority, General Authority for Statistics, SAMA, etc) and relevant international academic studies.
- **Data Tools:** Document/content analysis and econometric modeling.

VI. Literature Review

Below is a review of the most prominent previous studies that addressed the relationship between tourism and sustainable development. Each study is presented separately to clarify its objectives, methodology, and key findings:

1- Mekki's Study (2024)

This study, titled "Domestic Tourism and Its Impact on Promoting the Social Dimensions of Sustainable Development in light of the Kingdom of Saudi Arabia's Vision 2030," focused on the social dimension of development. The research sought to identify the impact of domestic tourism on enhancing specific dimensions, such as education and training, community participation, and women's empowerment. Using the descriptive analytical approach and applying an electronic questionnaire as the main data collection tool, the study concluded that there is a significant positive impact of local tourism on promoting these social dimensions,

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with an average impact score of 4.48. The results showed that the "Education and Training" dimension related to tourism ranked first (average 4.64) followed by the "Community Participation" dimension (average 4.49) and finally the dimension of women's empowerment (average 4.36) This highlights tourism's role in building human and social capital.

2- Al-Salmi and Al-Deeb's Study (2023)

This study, titled "Measuring the Impact of Tourism on Economic Growth in the Kingdom of Saudi Arabia", aimed to analyze the quantitative relationship between tourism activity and macroeconomic variables such as Gross Domestic Product (GDP) and employment volume. The researchers relied on the inductive and deductive approaches, along with statistical analysis of time-series data. A key finding was the existence of a positive and direct relationship between tourism and economic growth in the Kingdom of Saudi Arabia. The econometric model showed that a 1% increase in tourism sector employees (represented by the variable (X-3)) could contribute to an increase in GDP (represented by (Y)) by (2.933%) as reflected in the regression equation: This finding confirms the sector's vital role as a crucial economic driver.

3- Al-Salem's Study (2020)

This study addressed the reality of incorporating curriculum priorities, including sustainable development, into the Social Studies textbook for the third intermediate grade in the Kingdom. Using a content analysis tool, the study revealed a variation in the level of inclusion of sustainable development indicators, which necessitated proposing a framework for integrating these priorities more systematically. This research reflects the official national interest in integrating sustainability concepts into education, aligning with Saudi Vision 2030, and providing an important context for the current research.

4- Al-Rasheed's Study (2020)

This study examined the extent to which Saudi Vision 2030's Sustainable Development Goals were included in the Science textbook for the third primary grade in Saudi Arabia. The study utilized a descriptive-analytical approach to analyze the content, excluding questions and

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indices. The study reached a significant conclusion: there was an imbalance in the representation of the dimensions, with only two dimensions of sustainable development being included: the social dimension, which received the largest representation (93.8%), and the environmental dimension, which ranked second (6.2%). Crucially, the economic dimension was entirely disregarded. This result indicates a gap in the comprehensive application of the sustainability concept, which the current study seeks to address.

VII. Research Gap

The research gap lies in the absence of an integrated approach simultaneously linking the economic, social, and environmental dimensions within a unified analytical framework and measuring their collective impact in the context of Vision 2030. This study addresses the gap with a mixed quantitative–qualitative analysis of tourism's integrated role in Saudi sustainable development.

First Chapter: The Saudi Economy Before Vision 2030

Introduction

The world is witnessing a strategic shift toward adopting sustainable development as a modern philosophy that surpasses quantitative economic growth to achieve comprehensive and balanced progress. This model is based on three dimensions: the economic (ensuring welfare and prosperity); the social (promoting justice stability and quality of life) and the environmental (preserving natural resources for future generations) This global orientation is not a luxury but a necessity dictated by present challenges and future ambitions Within this global context Saudi Vision 2030 emerges as an ambitious national roadmap designed to reshape the economy and society and achieve a historic developmental leap aiming primarily to diversify income sources and build a prosperous, sustainable economy not dependent primarily on oil In parallel it develops a vibrant society that maintains its original values opens up to the world and preserves its environment and natural endowments Achieving these major goals places the tourism sector in a strategic position - not only as a promising economic sector but as a driving force for overall development given its interconnectedness with other sectors job creation investment attraction infrastructure development and fostering cultural heritage and local empowerment.

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The true success of the tourism sector cannot be measured by economic growth alone but by its ability to achieve integrated sustainable development. Economic prosperity in tourism cannot come at the expense of the natural environment or cultural identity-this is where the essence of sustainability lies: balancing the three dimensions, so that tourism's economic returns support heritage empower local communities and major tourism projects are designed with top environmental standards Based on this integrated vision the present paper provides a comprehensive analysis of how the tourism sector in all its dimensions contributes to the objectives of sustainable development within Vision 2030 The study examines the economic social and environmental impacts of the sector not as separate elements but as an integrated system where each dimension interacts to support Saudi Arabia's ambitious national transformation.

Subsection 1: The Structure of the Saudi Economy (Previously)

First: Foundations of Strength and Underlying Challenges

In the years before Vision 2030 - particularly from 2010 - 2015 - the Saudi economy stood on strong macroeconomic indicators However underlying this apparent strength were deep structural challenges. The social and economic model was based on an "unwritten social contract" the state used oil revenues to ensure citizens' prosperity via wide - ranging public sector employment generous subsidies and mega infrastructure spending In exchange social stability and political loyalty were maintained.

The public sector completely dominated citizen employment with unbeatable benefits while the private (non-oil) sector relied heavily on low-cost expatriate labor. Non-oil activity was closely tied to oil prices, not globally competitive and mainly serviced by government contracts and consumer demand fueled by public salaries. Although this model achieved high living standards, it carried seeds of unsustainability: any oil price crash, like that of mid-2014, threatened the entire model, leading to budgetary pressures and non-oil recession.

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Second: The Status of Tourism - A One-Dimensional, Limited Sector

In this context, tourism existed but was far from an integrated industry or a diverse economic driver Before Vision 2030 tourism was one - dimensional and limited with religious tourism (Hajj and Umrah) dominating completely Infrastructure and investments centered around serving religious visitors in Mecca and Medina.

Table 1: Reasons for Visitor Arrivals to Saudi Arabia (Pre-Vision 2030)

Purpose of Visit	Percentage (%)
Religious	52.7%
Visiting family/friends	17.9%
Business & conferences	16.1%
Leisure & shopping	7.0%
Other	6.3%

Source: Ministry of Tourism aggregated data

The most significant activity by volume was domestic tourism driven by local holidays and family visits while international leisure tourism was virtually non-existent due to visa constraints. The majority of Saudi tourism spending "leaked" abroad, as Saudi travelers sought experiences elsewhere.

Table 2: Comparison of Domestic and International Tourist Trips (2010–2015)

Year	Domestic Trips (mn)	International Trips (mn)
2010	32.0	10.9
2011	29.0	14.2
2012	29.0	16.3
2013	26.0	15.8
2014	37.1	18.3
2015	46.5	18.0

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Source: Aggregated Statistical Data from the Ministry of Tourism

In addition to religious and local activities, business tourism also constituted a secondary stream, yet it was directly linked to the oil-driven economy. Businessmen and experts travelled to the Kingdom to attend energy conferences or to conclude contracts related to government projects concentrating mainly in the principal urban centres-Riyadh Jeddah and the Eastern Province. At the same time the potential of domestic and leisure tourism remained largely untapped. This segment suffered from fundamental challenges, namely the absence of an integrated tourism product (no world-class resorts, entertainment cities or attractive events) and the near-impossibility of obtaining a non-religious or non-commercial visa which effectively closed the door to international tourists. Consequently a massive tourism-expenditure leakage occurred: Saudi travellers preferred foreign destinations for their holidays, resulting in billions of riyals flowing out of the national economy each year In short, before Vision 2030 the tourism sector was not treated as an independent strategic pillar; the Kingdom's enormous potential lay dormant, a hidden treasure awaiting discovery This reality together with the shock of falling oil prices, gave rise to the idea of converting tourism into one of the new pillars of the Saudi economy under Vision 2030.

III. Tourism in the Kingdom before the Vision – Sustainable-Development Balance

Sustainable development is defined as "the process of meeting the needs of the present generation without compromising the ability of future generations to meet their own needs." It rests on three mutually reinforcing pillars: economic, social and environmental. An analysis of the Saudi tourism sector for the period 2010-2015 through these lenses reveals that the then-prevailing model lacked integration and sustainability.

1. Economic Dimension – Limited Growth and Weak Sustainability

Although tourism contributed revenue and hard currency to the national economy, its economic sustainability was constrained by several factors:

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-- **Lack of diversification and high dependence:**

- The sector relied almost exclusively on a single product—religious tourism. This mono-product dependence rendered the industry vulnerable to any shock and limited its capacity for growth and diversification, contradicting the principle of sustainable economic growth, which requires a diversified income base.

-- **Linkage to rent-based economy:**

- Massive infrastructure projects serving tourism (especially in Mecca and Medina) were financed directly from oil revenues. The tourism sector therefore functioned not as a self-sustaining competitive industry but as an extension of the state's spending power, making it highly sensitive to fluctuations in energy prices.

-- **Limited generation of sustainable jobs for nationals:**

- Although the sector created employment, the localisation ratios were very low, diminishing the direct positive economic impact on Saudi citizens and undermining the sustainability of social-economic development.

2. Social Dimension – Unbalanced Development

The social pillar of sustainable development seeks equity, community participation, cultural identity and an improved quality of life for all members of society. The tourism model of the period displayed both positive and negative aspects:

-- **Positive social contribution:**

- Religious tourism played a central cultural and social role, reinforcing-the Kingdom's status as the focal point of the Islamic world and serving millions of Muslims—an outcome with deep social significance.

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-- **Negative spatial imbalance:**

- Investment and development were almost exclusively concentrated in the holy cities of Mecca and Medina, neglecting other regions endowed with unique historical and natural assets (e.g., Al-Ula, Diriyah, Madain Saleh). This geographic bias prevented balanced regional development, a prerequisite for social sustainability.

-- **Limited cultural exchange:**

- Because inbound tourism was predominantly religious, opportunities for intercultural interaction were scarce, hindering the sector's role as a bridge for global cultural dialogue—one of the core objectives of sustainable tourism.

-- **Weak community participation:**

- Tourism governance was highly centralized; there were no effective mechanisms to involve local communities in non-core areas in planning, implementation or benefit-sharing, contravening the participatory principle of sustainable development.

3. Environmental Dimension – Near-Total Absence of Green Concepts

The environmental pillar is the cornerstone of sustainability, focusing on the protection of natural resources and ecosystems for future generations. Between 2010 and 2015 this pillar was virtually missing from the Saudi tourism agenda:

-- **Absence of eco-tourism as a product:**

- The Kingdom's vast natural endowments—coasts, deserts, mountains—remained untapped, and eco-tourism was not presented as a mainstream offering.

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-- **Infrastructure-centric development:**

- Massive urban infrastructure was built to accommodate large visitor volumes in a few selected cities, yet no transparent environmental-impact-assessment (EIA) procedures aligned with contemporary sustainability standards were applied.

-- **Institutional awareness deficit:**

- Concepts such as "green economy" or "integrated environmental management" were not incorporated into tourism policies of the period. These ideas only entered the policy discourse after the adoption of Vision 2030 and the emergence of new global sustainability trends.

Summary of the Pre-Vision Period (2010-2015)

During 2010-2015 the Saudi tourism sector functioned more as an **economic activity** than as a **sustainable development sector** It suffered from:

- **Economic shortcomings:** lack of diversification, over-reliance on oil-financed infrastructure, and low localisation of jobs.
- **Social shortcomings:** uneven spatial development, limited cultural exchange, and weak community-level participation.
- **Environmental shortcomings:** negligible eco-tourism, absence of environmental safeguards, and limited institutional awareness of green concepts.

These deficiencies made the sector ill-suited to deliver the balanced inclusive growth envisioned by Vision 2030. Consequently the transformation mandated by Vision 2030 became not only a strategic imperative for economic diversification but also a necessary rebuilding of the tourism sector on the foundations of comprehensive integrated sustainable development.

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Chapter Two: The Saudi Economy Post-Vision 2030

I. Vision 2030

Saudi Arabia's Vision 2030 represents a fundamental turning point for the tourism sector, having transformed it from an industry almost entirely dependent on religious tourism into a comprehensive strategic engine for sustainable development across its economic, social, and environmental dimensions. The Vision aims to build a prosperous and sustainable tourism sector that contributes effectively to national economic diversification, enhances the quality of life, and preserves the Kingdom's cultural and natural heritage for future generations.

The following is a detailed analysis of the orientations of Vision 2030 regarding tourism and sustainable development, segmented according to the three main pillars of sustainability:

1. The Economic Dimension (Diversifying the Economy and Creating a New Growth Engine)

The core economic objective of the Vision is to reduce reliance on oil, and tourism is considered one of the primary pillars for achieving this diversification. This strategy is realized through several key areas:

A/ Ambitious Targets

The Kingdom aims to raise the tourism sector's contribution to the Gross Domestic Product (GDP) to **10% by 2030** and attract massive investments reaching **810 billion**The ambition level for attracting visitors (both domestic and international) has been raised to **150 million annually by 2030** after the initial target of 100 million visitors was achieved seven years ahead of schedule.

B/ Mega Projects (Mega Projects)

Giant tourism, entertainment, and cultural projects have been launched, such as the **NEOM** project, the **Red Sea Project, Qiddiya, Diriyah** and **AlUla** These projects are not merely

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intended to attract tourists but to create integrated and interconnected economic ecosystems around them.

C/ Developing Infrastructure and Absorptive Capacity

The Vision is working to enhance the sector's absorptive capacity, with the government aiming to increase the number of hotel rooms from 280,000 to **550,000 rooms by 2030** This comprehensive development includes improving essential and service infrastructure, such as airports, roads, and public facilities, to facilitate access to tourist destinations.

D/ Attracting Investments and Empowering the Private Sector

The **"Tourism Development Fund"** was established with a capital of **15 billion riyals** to finance and attract high-quality tourism investments. The Vision aims to bolster the role of the **private sector** as the main driver of development, while the government focuses on its legislative and regulatory role.

2. The Social Dimension (Empowering Society and Enhancing Quality of Life)

Vision 2030 extends beyond a strictly economic view of tourism linking it closely to societal empowerment and welfare through:

A/ Creating Job Opportunities and Developing Human Capabilities

Tourism is one of the most labor-intensive industries. The Vision targets providing **1 million new job opportunities** within the sector. To support this, programs for qualifying and empowering national competencies have been launched, such as the **"Tourism Pioneers"** program for human capital development alongside comprehensive training programs for young men and women.

B/ Involving Local Communities

The Vision emphasizes the importance of involving local communities in the tourism development process to ensure a fair distribution of economic and social returns. This is

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achieved by encouraging Small and Medium-sized Enterprises (SMEs) such as family hospitality farms and craft shops, and supporting productive families.

C/ Preserving National Identity and Cultural Heritage

The Vision views tourism as a vehicle for showcasing the Kingdom's rich cultural and historical heritage. These directions are manifested in significant efforts to develop historical and heritage sites registered on the UNESCO list (AlUla, Diriyah) transforming them into global cultural destinations. This approach not only preserves heritage but also fosters national pride and enriches the visitor experience.

D/ Enhancing Quality of Life

The development of the entertainment, sports, and cultural sectors, as an integral part of the tourism ecosystem, contributes to improving the quality of life for citizens and residents and provides diverse recreational options.

3. **The Environmental Dimension (Protecting Natural Resources and Ensuring Sustainability)**

Vision 2030 recognizes that the long-term sustainability of the tourism sector fundamentally depends on protecting the environment and natural resources, achieved through:

A/ Eco-Tourism and Sustainable Tourism
The Vision adopts the concept of **"Sustainable Tourism"** which balances economic and social needs with environmental protection. Major projects, such as the **Red Sea Project** and **"Amaala"** were designed from the outset to be global models for sustainable tourism, focusing on renewable energy and preserving sensitive ecosystems such as coral reefs and mangroves.

B/ Integration with National Environmental Initiatives (Saudi Green Initiative)
The Saudi Green Initiative aims to plant **10 billion trees** and protect **30% of the Kingdom's land and marine areas by 2030** This fosters a natural environment attractive for eco-tourism and ensures the sustainability of resources for future generations.

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C/ Developing Natural Destinations

Plans include developing natural areas such as valleys, coasts, and deserts, transforming them into destinations for eco-tourism and adventure, coupled with the implementation of strict controls for their preservation.

In Conclusion

Vision 2030 has initiated a strategic transformation in Saudi Arabia's tourism philosophy.

Instead of being a limited economic activity tourism has become a comprehensive tool for achieving sustainable development: it diversifies income sources and creates jobs (Economic Dimension) empowers society and preserves its identity (Social Dimension) and protects and invests in natural resources (Environmental Dimension) thus ensuring the construction of a prosperous and sustainable future for all.

Figure 1: Summary of Vision 2030 Objectives

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The structural evolution of the Saudi economy within the tourism and sustainable development sectors can be divided into several distinct phases, each reflecting a stage of maturity and strategic development under Vision 2030.

1. Phase One: The Foundational and Empowerment Phase (2016 – 2019)

This phase established the cornerstone for the transformation, focusing on laying the legislative and institutional groundwork and launching the mega-projects that would drive future growth.

I. In the Tourism Sector (Legislative and Institutional Reforms)

- **A/ Legislative Launch:** The most significant event was the launch of the electronic tourist visa in September 2019, which opened the Kingdom's doors to the world for the first time, covering tourists from 49 countries (later expanded to 66 nations). This decision served as a true turning point for the sector.
- **B/ Building the Organizational Structure:** Foundations were laid for the establishment of specialized entities that would later lead the sector, such as the Ministry of Tourism the Saudi Tourism Authority, and the Tourism Development Fund.
- **C/ Launching Mega Projects:** This period saw the announcement of the colossal tourism projects forming the core of the Vision, notably the Red Sea Project, NEOM, Qiddiya, and AlUla The focus here was primarily on strategic planning and attracting initial investments.

II. In the Sustainable Development Sector

- **D/ Establishing Strategic Frameworks:** Vision Realization Programs, such as the National Transformation Program, were launched, setting objectives and initiatives for structural reforms across all government sectors.
- **E/ Social Empowerment:** Wide-ranging social reforms began to empower segments of society, notably the empowerment of women through allowing them to drive and increasing their opportunities in the labor market.

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- **F/ Environmental Foundation:** The National Center for Vegetation Cover Development and Combating Desertification was established as a preliminary step toward achieving the Vision's ambitious environmental goals.

2. Phase Two: The Acceleration and Growth Phase (2020 – 2024)

Despite the global challenge posed by the COVID-19 pandemic at the beginning of this phase, it witnessed unprecedented acceleration in the pace of achievement, resulting in outcomes that surpassed expectations:

I. In the Tourism Sector

- **A/ Record Growth in Numbers:** Following the slowdown in 2020 due to the pandemic, the sector experienced an explosive growth surge, achieving the target of **100 million visits** in 2023. The Kingdom announced that it had hosted **106.2 million visits** (77 million domestic and 29.2 million international), thus surpassing the 2030 target seven years ahead of schedule.
- **B/ Global Leadership:** The Kingdom ranked first among G20 countries in the growth rate of international tourist arrivals in 2023 compared to 2019.
- **C/ Historic Revenue:** Total tourist spending in 2023 reached approximately **250 billion riyals** including **135 billion riyals** from inbound tourism—the highest figure in the Kingdom's history.
- **D/ Enhanced Economic Contribution:** The direct contribution of the tourism sector to GDP increased from approximately 3% in 2019 to **4.5%** by the end of 2023, while the total direct and indirect contribution reached **7%.**
- **E/ Job Creation:** The number of employees in the sector reached **925,000** by the end of 2023, moving closer to the target of one million jobs.
- **F/ Infrastructure Maturity:** Mega Projects began yielding results, with the opening of luxury destinations in the Red Sea Project and the development of heritage sites in AlUla and Diriyah which welcomed millions of visitors.

II. In the Sustainable Development Sector

- **G/ Activation of Green Initiatives:** The implementation of the Saudi Green Initiative accelerated. By the end of 2023, more than **49 million trees** were planted **94,000**

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hectares of degraded land were rehabilitated, and the area of protected regions exceeded **18%** of the Kingdom's total area.

- **H/ Renewable Energy:** Several solar and wind energy projects were commissioned, with the clean energy production capacity reaching **2.8 Gigawatts** and the Kingdom recording globally competitive figures for the low cost of electricity production from solar power.
- **I/ Social and Economic Leaps (Women's Participation):** The Kingdom achieved a historic leap in female labor force participation, rising from **19.4%** at the end of 2017 to **36%** by 2030, thus exceeding the Vision's target of 30%.
- **J/ Private Sector and SME Growth:** The number of Small and Medium-sized Enterprises (SMEs) witnessed a growth of over **200%** in 2023, driven by regulatory reforms and support programs such as the SME Bank and the Kafalah program.

3. Phase Three: The Maturity and Deepening Phase (2025 Onwards – Future Outlook)

Building upon the successes achieved, the Kingdom is now entering a new phase focused on quality and long-term sustainability, structured as follows:

I. In the Tourism Sector (Focusing on Experience Quality)

- **A/ Experience Enrichment:** After achieving quantitative goals, the focus shifts toward enriching the tourist experience and developing specialized tourism products (e.g., adventure tourism, cultural tourism, marine tourism).
- **B/ Sustainability as a Core Criterion:** Mega Projects like the Red Sea Global and NEOM aim to become fully sustainable destinations, relying on **100% renewable energy** and implementing circular economy principles.
- **C/ Full Digital Transformation:** Deepening the use of technology across all aspects of the tourist journey from planning and booking via platforms such as "Nusuk" to interactive experiences at tourist sites.

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II. In the Sustainable Development Sector (Expanding the Scope of Environmental Projects)

- **D/ Environmental Scaling:** Transitioning from pilot projects to large-scale implementation of carbon capture and green hydrogen technologies, and accelerating the pace of afforestation to meet the 10 billion tree target.
- **E/ Deepening Social Reforms:** Focusing on the sustainability of social empowerment and enhancing human capital through human capability development programs, ensuring that the fruits of development reach all segments of society and regions.

Table No. 3: Evolution of the Number of Saudi Citizens in the Tourism Sector

Phase / Year	Number of Working Citizens (Approximate)	Key Initiatives and Drivers
The Foundational Phase (2018)	~ 210,000 male and female citizens	The initial stages of the Vision's programs. Focus on building strategies and limited jobs allocated to Saudis before concentrated Saudization decisions.
The Launch Phase (2021)	~ 260,000 male and female citizens	Launch of the tourist visa; Establishment of the Tourism Development Fund; Initiation of training and qualification programs for national cadres, such as Tourism Pioneers.
End of 2023 / Beginning of 2024 (The Acceleration and Growth Phase)	Exceeding 300,000 male and female citizens	Implementation of Saudization decisions for professions in the tourism accommodation sector; Massive growth in mega-projects (Red Sea, AlUla); Increased demand for Saudi competencies; Employment support programs.

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Phase / Year	Number of Working Citizens (Approximate)	Key Initiatives and Drivers
Target by 2030	A significant portion of the targeted one million jobs	Completion of mega-projects and expansion into the entertainment and culture sectors; Maturity of national competencies to assume leadership positions.

(Estimates based on official data)

The table above highlights the clear upward trajectory of integrating national talent into the tourism sector—a trend that unmistakably reflects the impact of the strategic policies and initiatives stemming from Vision 2030 During the initial foundational phase (2018) efforts were concentrated on establishing the sector's regulatory framework, which kept the pace of Saudization relatively modest A radical shift began with the launch phase (2021) marked by the activation of key instruments such as the tourist-visa rollout and the creation of the Tourism Development Fund. These measures injected substantial investment, spurred demand, and generated new employment opportunities for Saudi citizens The acceleration phase (2023-2024) witnessed a qualitative leap in the number of Saudi employees This surge is directly linked to the implementation of Saudization decisions in critical areas-particularly hotel accommodation-coinciding with the commencement of the first stages of flagship tourism projects like the Red Sea and Al-Ula developments. These mega-projects created an unprecedented demand for qualified national cadres Consequently the figures do not merely represent a quantitative increase in jobs they signal a strategic transformation toward a sustainable tourism sector built on domestic human capital This transformation directly supports Vision 2030's ambitious goal of creating one million jobs in the sector by 2030.

Chapter Three: Study Methodology and Measurement of Variables

Moving from the theoretical discourse and conceptual framework established in previous chapters, this chapter aims to define the analytical and methodological framework for the study. After reviewing the economic literature that linked the tourism sector with Sustainable

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Development Goals, the need arises to empirically test this relationship within the context of the Saudi economy and the ambitious Vision 2030. To achieve this goal, the study will rely on Econometric Modeling as the most suitable methodological tool for quantitatively measuring the magnitude and direction of the relationship between economic variables, determining the statistical significance of the tourism sector's impact on economic growth, and constructing a robust econometric model that forms the backbone of this study. This model allows for the conversion of theoretical hypotheses into measurable and testable relationships.

Accordingly, this chapter will detail the construction of the study's econometric model through the following axes:

1. **Formulation of the Econometric Model:** Presenting the standard form of the model that describes the relationship between economic growth and tourism sector indicators.
2. **Definition of Study Variables and Measurement Methods:** Precisely identifying the dependent and independent variables and clarifying how each variable is statistically measured.
3. **Determination of Expected Parameter Signs:** Based on economic theory and prior studies, the expected sign for each independent variable will be determined, representing the sub-hypotheses of the study.
4. **Data Sources:** Clarifying the official data sources relied upon to collect the time series data for the study variables during the period **(1990–2024)**.

This methodological structure aims to ensure accuracy and objectivity in data analysis to reach reliable results that contribute to providing practical recommendations serving Vision 2030's objectives in developing the tourism sector and enhancing its role in achieving sustainable economic growth.

Requirement One: Formulation of the Econometric Model

First: The Proposed Model

To analyze and measure the impact of the tourism sector on economic growth in the Kingdom of Saudi Arabia, a Multiple Linear Regression Model in its Double Logarithmic Form (Log-Log Model) was constructed. This specific form was chosen because it allows for the

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interpretation of the estimated parameters (beta) directly as Elasticities In other words the estimated coefficient of each independent variable will directly indicate the percentage change in the dependent variable (Economic Growth) when that independent variable changes by 1% holding all other factors constant (ceteris paribus).

Thus the mathematical formula for the model is as follows:

$$\hat{Ln}(GDP\_NONOIL_t) = \beta_0 + \beta_1 Ln(TOUR\_REV_t) + \beta_2 Ln(TOTAL\_TOURISTS_t) + \beta_3 Ln(TOUR\_EMP_t) + \beta_4 Ln(CO2\_EMISSIONS_t) + \varepsilon_t$$

Second: Definition and Measurement of Study Variables

Below is an operational definition for each variable in the model its method of measurement and the expected sign of its parameter based on economic theory:

1- Dependent Variable {Dependent Variable}

* **Real Non-Oil Gross Domestic Product {GDP-NONOIL}:** This variable was chosen because it accurately expresses the real and sustainable economic growth that Vision 2030 seeks to achieve by isolating the effect of oil sector fluctuations and inflation. Billion Saudi Riyals (at 2018 base year prices).

2- Independent Variables {Independent Variables}: Variable Definition and Rationale Unit of Measurement | Expected Sign beta.

* **Total Tourism Revenue {TOUR-REV}:**This variable represents the direct cash flows generated by the sector and reflects the volume of tourist spending (inbound and domestic) and is considered a direct indicator of tourism's financial contribution to the economy. Billion Saudi Riyals (+) It is expected that an increase in tourism revenues will lead to a direct increase in the Gross Domestic Product.

***Total Number of Tourists (Inbound and Domestic) {TOTAL_TOURISTS}_** This variable expresses the total volume of demand for tourism services An increase in tourist numbers stimulates demand in related sectors such as transport accommodation food and

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beverages and entertainment Million Tourists (+) It is expected that an increase in the number of tourists will lead to an increase in economic activity and thus GDP growth.
* **Total Number of Employees in the Tourism Sector and Related Activities {TOUR_EMP}** This variable measures the social and economic impact of the sector by providing job opportunities. Increased employment means increased individual incomes, which enhances purchasing power and aggregate demand in the economy Thousand Workers (+) Increased employment contributes to raising income and spending levels, supporting economic growth.
* **Total Carbon Dioxide Emissions {CO}_2 {EMISSIONS}** This is the most common and widely used indicator for measuring tourism pollution (especially air and land transport) Related economic activities increase these emissions{kt} of {CO}_2 emissions (+)| An increase in the number of tourist trips contributes to raising carbon dioxide emission levels.

3- Model Parameters and Other Symbols

* **Constant beta {Intercept}**: Represents the expected value of the dependent variable when all independent variables equal zero.
Model Parameters (beta1 – beta5 {Coefficients}: Measure the elasticity of the Non-Oil Gross Domestic Product in response to each variable of the tourism sector.
Ln: Denotes the natural logarithm.
t: Denotes the time period (annual).
ε_t: Denotes the random error term {Error Term} which includes the effect of all factors not included in the model Requirement Two: Analysis and Discussion of Results This part aims to present and analyze the results reached through estimating the econometric model formulated in the previous requirement It will first review the statistical characteristics of the study variables, then present the regression results and interpret them economically and finally link them to the study's objectives and the Kingdom's Vision 2030.

Section Two: Analysis and Discussion of Results

This part aims to present and analyze the results reached through estimating the econometric model formulated in the previous section It will first review the statistical properties of the

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study variables then present the regression results and interpret them economically and finally link them to the study's objectives and the Kingdom's Vision 2030.

First: Descriptive Statistics of the Study Variables

The following table presents the descriptive statistics for the study variables during the period (2010 – 2024 AD) which include the arithmetic mean standard deviation and the minimum and maximum values for each variable.

Table (4): Descriptive Statistics of the Study Variables (2010 - 2024)

(Variable)	(Description)	Mean	Standard Deviation	Minimum Value	Maximum Value
{GDP-NONOIL}	Non-Oil Gross Domestic Product (Billion SAR)	1.81E+10	2.52E+10	63366.00	6.73E+10
{TOUR-REV}	Tourism Revenues (Billion SAR)	25141686	31510408	1600000	1.16E+08
{TOTAL-TOURISTS}	Total Number of Tourists (Million Tourists)	1.28E+10	1.08E+10	1.30E+09	4.98E+10
{TOUR-EMP}	Employees in Tourism (Thousand Workers)	1.81E+10	2.52E+10	63366.00	6.73E+10
{CO}−2	Total Carbon Dioxide Emissions	63968869	1.02E+08	173480.0	2.45E+08

The table above shows a noticeable variation in the tourism sector variables, which reflects the significant developments the sector has witnessed, especially after the launch of Vision 2030. For example, the wide range between the minimum and maximum values for Total Number of Tourists {TOTAL-TOURISTS} and Revenues {TOUR-REV} reflects the major impact of the pandemic in 2020 and the accelerated growth that followed Furthermore the significant growth in Employees in Tourism {TOUR-EMP} indicates the increasing role of the sector in creating job opportunities which is one of the fundamental pillars of sustainable development.

Secondly: Stability of Variables

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Table (5): Augmented Dickey-Fuller Test

Independent variable	Stability	(ADF t-Statistic) test statistic	decision at the 5% significance level
GDP- nonoil	1st difference	5.966	2.954
Tour – rev	Level	3.179	2.981
Total - tourists	1st difference	5.296	2.963
Tour - emp	1st difference	5.966	2.9971
co2	1st difference	5.791	2.954

Third: Preliminary Estimation Results of the Autoregressive Distributed Lag {ARDL} Model

The initial model for the dynamic relationship between non-oil GDP {GDP_NONOIL} and tourism and environmental variables was estimated using the Autoregressive Distributed Lag {ARDL methodology The optimal structure of the model was chosen based on the Akaike Information Criterion {AIC} as the best model representing the data dynamics (4, 3, 4, 3, 4)The estimation results showed the following:

Overall Goodness of Fit and Statistical Significance

- The value of (R^2) reached {0.954064}) and the value of {adj R^2} reached {0.827738} These high values indicate that the independent variables included in the model (including their lags) explain more than 95% of the variation occurring in the dependent variable {GDP-NONOIL} reflecting the model's high explanatory power.
- The probability value ((P)-value of the {F-statistic=0.0030} is less than 5% leading us to reject the null hypothesis of no relationship and confirm that the model as a whole has strong statistical significance and that the independent variables significantly affect non-oil GDP.

Fourth: Cointegration Bounds Test {F-Bounds Test}

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The analysis results confirmed a positive statistically significant direct relationship between all explanatory variables and economic growth The results were as follows:

Table (6): Bounds Test – Test results

Test Statistic	Value	Signif.	I(0)	I(1)
{F-statistic}	4.846315	10%	2.2	3.09
(Number of Variables) – k	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

Since the value of the (F-statistic= 4.8463) is greater than the upper bound at all levels, this confirms that there is a stable long-term equilibrium relationship (cointegration) between non-oil GDP and the explanatory variables.

Fifth: Long-Run Model Estimation Results

This section illustrates the continuous equilibrium relationship between the variables in the long run The coefficients here are interpreted as elasticities due to the use of logarithms.

Table (7): Long-Run Model

$$\hat{L}n(GDP\_NONOIL_t) = \beta_0 + \beta_1 Ln(TOUR\_REV_t) + \beta_2 Ln(TOTAL\_TOURISTS_t) + \beta_3 Ln(TOUR\_EMP_t) + \beta_4 Ln(CO2\_EMISSIONS_t) + \varepsilon_t$$

Variable	Coefficient	Prob	Long-Run Impact
Tourism Employment **{LOG(TOUR_EMP)**	-115.3493	0.0201	Negative Impact: Long-term increase in tourism employment is associated with a decrease in non-oil GDP (1% increase in employment leads to a 1.15% decrease in non-oil GDP).
Tourism Employment **{LOG(TOUR_REV)**	109.0331	0.0169	Positive Impact: Long-term increase in tourism revenues leads to non-oil GDP growth (1% increase in revenues leads to a 1.09% increase in non-oil GDP).
Tourism Revenues {LOG(TR)	-36.85489	0.0129	Negative Impact: Increase in tourist arrivals is associated with a long-term decrease in non-oil

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			GDP (1% increase in tourists leads to a 0.36% decrease in non-oil GDP).
Carbon Emissions {LOG(CO2)	-2.123283	0.0973	Negative Impact: Increase in carbon emissions is associated with a slowdown or decrease in non-oil GDP.
Tourism Revenues {LOG(TOUR_REV)	109.0331	0.0169	Positive Impact: Long-term increase in tourism revenues leads to non-oil GDP growth (1% increase in revenues leads to a 1.09% increase in non-oil GDP).

This interpretation is complex: while tourism revenues represent a direct and positive driving force for the non-oil economy, the increase in the number of tourists and the number of employees leads to a negative long-term impact on non-oil GDP. This divergence indicates a structural challenge, as the expansion in human and tourism resources does not translate into a sustainable increase in non-oil GDP.

Sixth: Conditional Error-Correction Model

This section measures the short-run relationship and the speed of adjustment toward the long-run equilibrium.

Table (8): Conditional Error Correction Regression

Variable	Coefficient	Prob	Short-Run Impact
LOG(GDP_NONOIL)	-1.784650	0.0217	Error Correction Coefficient (EC): The coefficient is negative and statistically significant, confirming a long-run equilibrium. It indicates that approximately {178}% of the disequilibrium from the previous period is corrected in the current period to return to equilibrium (The high absolute value may suggest rapid correction or significant volatility).
LOG(TOUR_EMP) (Tourism Employment)	-456.3891	0.0042	Strong Negative Impact: An immediate increase in tourism employment in the short run leads to a sharp decrease in non-oil GDP.
LOG(TOUR_REV) (Tourism Revenues)	39.19712	0.0201	Positive Impact: Any immediate change in tourism revenues positively affects non-oil GDP in the short run.
LOG(TR) (Total Tourist Arrivals)	30.65505	0.0025	Positive Impact: Any immediate change in the number of tourists positively affects non-oil GDP in the short run.

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LOG(CO2) (Carbon Emissions)	-5.272425	0.0074	Negative Impact: The immediate increase in carbon emissions negatively pressures the growth of non-oil GDP.

While revenues and the number of tourists show an immediate positive impact in the same period, tourism employment shows an immediate negative impact This reinforces the hypothesis that employment in the tourism sector expands rapidly and with high labor intensity but without an accompanying immediate increase in efficiency or added value thus generating pressures on the gross non-oil GDP in the short term.

Seventh: order Granger Causality Test

This test examines the short-run (instantaneous) causal relationships between pairs of variables at a 5 % significance level ($\alpha = 0.05$) and makes the comparison using that significance threshold.

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(Table 9): Pair-wise Granger-Causality Test

Null-hypothesis (no causality)	F-Statistic	Prob. (p-value)	Decision at 5 %	Conclusion (causality)
TOUR_EMP → GDP_NONOIL (tourism employment does not cause non-oil GDP)	0.03297	0.8571	Do not reject	No causality
GDP_NONOIL → TOUR_EMP (non-oil GDP does not cause tourism employment)	0.02269	0.8812	Do not reject	No causality
TOUR_REV → GDP_NONOIL (tourism revenue does not cause non-oil GDP)	0.00575	0.9400	Do not reject	No causality
GDP_NONOIL → TOUR_REV (non-oil GDP does not cause tourism revenue)	0.55488	0.4619	Do not reject	No causality
TR → GDP_NONOIL (total tourist arrivals do not cause non-oil GDP)	0.24820	0.6219	Do not reject	No causality
GDP_NONOIL → TR (non-oil GDP does not cause total tourist arrivals)	0.40063	0.5314	Do not reject	No causality
CO_2 → GDP_NONOIL **(CO_2 emissions do** not **cause non-oil GDP)**	8.01625	0.0081	Reject	CO_2 → GDP_NONOIL **(unidirectional causality)**
GDP_NONOIL → CO_2 (non-oil GDP does not cause CO_2 emissions)	3.21738	0.0826	Do not reject	No causality
TOUR_REV → TOUR_EMP	12.1042	0.0015	Reject	TOUR_REV → TOUR_EMP **(unidirectional causality)**

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(tourism revenue does not **cause tourism employment)**				
TOUR_EMP → TOUR_REV (tourism employment does not cause tourism revenue)	0.85945	0.3611	Do not reject	No causality
TR → TOUR_EMP (total tourist arrivals do not cause tourism employment)	1.09436	0.3036	Do not reject	No causality
TOUR_EMP → TR **(tourism employment does** not **cause total tourist arrivals)**	23.1265	4×10^{-5}	Reject	TOUR_EMP → TR **(unidirectional causality)**
CO_2 → TOUR_EMP (CO_2 emissions do not cause tourism employment)	0.16425	0.6881	Do not reject	No causality
TOUR_EMP → CO_2 (tourism employment does not cause CO_2 emissions)	0.08985	0.7664	Do not reject	No causality
TR → TOUR_REV (total tourist arrivals do not cause tourism revenue)	1.92151	0.1756	Do not reject	No causality
TOUR_REV → TR **(tourism revenue does** not **cause total tourist arrivals)**	9.26795	0.0047	Reject	TOUR_REV → TR **(unidirectional causality)**
CO_2 → TOUR_REV (CO_2 emissions do not cause tourism revenue)	0.19766	0.6597	Do not reject	No causality
TOUR_REV → CO_2 (tourism revenue does not cause CO_2 emissions)	0.03289	0.8573	Do not reject	No causality
CO_2 → TR (CO_2 emissions do not	0.22439	0.6390	Do not reject	No causality

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cause total tourist arrivals)				
TR → CO_2 (total tourist arrivals do not cause CO_2 emissions)	0.23086	0.6343	Do not reject	No causality

The bivariate Granger-causality test shown in the table above is designed to identify short-run causal directions between pairs of variables using a single-lag specification. The results reveal several noteworthy findings, the most prominent being strong unidirectional causality among some internal tourism-sector variables Tourism revenue (TOUR_REV) causes tourism employment (TOUR_EMP) with a probability of (4×10^{-5}) Tourism employment (TOUR_EMP) in turn causes total tourist arrivals (TR) with the same probability (4×10^{-5}). CO_2 emissions (CO_2) cause non-oil GDP (GDP_NONOIL) with a probability of (0.0081).

However the most striking outcome is that the null hypothesis of no short-run causality between the tourism activity indicators (employment, revenue) and non-oil GDP is not rejected This indicates that the economic impact of tourism on non-oil growth is not immediate or direct in the short term (given the current lag length).Because overall economic growth and the development of key sectors usually generate structural effects that materialize over the long run it is necessary to verify whether these variables share a long-run equilibrium relationship (cointegration) Consequently, conducting a Conditional Error-Correction Model (ECM) analysis becomes essential to explore both short-run and long-run causality in a comprehensive and integrated manner.

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(Table 10): Summary of the results of estimating the coefficients of the Vector Autoregressive (VAR) model

Dependent Variable (Equation)	Independent Variable (Lag)	Coefficient Value { B}	t-Statistic	Significance Level	Direction of Relationship	Goodness-of-Fit Indicators
{GDP_NONOIL}	{CO2(-1)}	678.1246	2.716	Subjective / Significant	Positive	Adj. R^2= 78.43% **{F}=12.63**
{TOUR_EMP}	{TOUR_EMP(-1)}	0.470630	2.439	Subjective / Significant	Positive	Adj. R^2= 96.08% **{F}=79.38**
	{TOUR_EMP(-2)}	0.919094	2.590	Subjective / Significant	Positive	
	{TR(-2)}	-1.19{E}-05	-4.327	Very Subjective / Very Significant	Negative	
{TOUR_REV}	{GDP_NONOIL(-1)}	-0.001724	-2.975	Subjective / Significant	Negative	Adj. R^2= 95.37% **{F}=66.85**
	{TOUR_EMP(-2)}	116.1189	2.002	Subjective / Significant	Positive	
	{TOUR_REV(-1)}	1.095741	5.043	Very Subjective / Very Significant	Positive	
	{CO2(-1)}	0.464727	3.118	Subjective / Significant	Positive	

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{TR}	{GDP_NONOIL(-1)}	-0.652332	-2.341	Subjective / Significant	Negative	Adj. R^2= 90.57% **{F}=31.74**
	{GDP_NONOIL(-2)}	0.703082	2.312$	Subjective / Significant	Positive	
	{TOUR_EMP(-1)}	51753.38	3.413	Very Subjective / Very Significant	Positive	
	{TOUR_REV(-2)}	-352.7076	-2.908	Subjective / Significant	Negative	
	{TR(-1)}	0.589774	3.216	Subjective / Significant	Positive	
	{CO2(-1)}	179.2889	2.502	Subjective / Significant	Positive	
	{CO2(-2)}	-183.1728	-2.131	Subjective / Significant	Negative	
{CO2}	{CO2(-1)}	2.417376	2.566	Subjective / Significant	Positive	Adj. R^2 =80.73% **{F}=14.41**

The results indicate the existence of strong and statistically significant interactions between the lagged dynamics of the variables affirming the close interconnectedness between the tourism sector non-oil economic growth, and the economic and environmental impact in the Kingdom of Saudi Arabia.

1- Analyzing Model Fit Measures {Model Fit}

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The model results demonstrate a very high explanatory power for all equations, manifested as follows:

- **Explanatory Power R^2**: Exceptionally high levels of explanatory power were achieved for all equations. For example, the variance in tourism employment and revenues was explained by (97.3%) and (96.8%), respectively, indicating that the self-dynamics of the variables (lagged values) play a crucial role in determining their future trajectory.
- **Model Significance (F)-statistic)**: The model significance is very high for all equations, demonstrating that the model as a whole has strong statistical significance in explaining the dependent variable.

2- Analyzing the Impacts of Tourism Variables on the Economy and Environment:

The coefficient results reveal strong direct and indirect impacts of tourism activity.

- **Impact of Tourism on Non-Oil GDP {GDP_NONOIL}**:
  Tourism variables did not show a strong direct impact on Non-Oil GDP growth through the employment and tourism revenue coefficients in the available time lags Nevertheless estimates suggest that the non-oil economy is significantly influenced by other dynamics.
- **Environmental Impact**:
  The first lag of carbon dioxide emissions {CO2} showed a positive and strongly significant impact on Non-Oil GDP growth. This indicates that increasing economic activities, including tourism activities accompanied by an increase in emissions, contribute to Non-Oil GDP growth.

3- Internal Dynamics of the Tourism Sector:

- **Tourism Employment {TOUR_EMP}**:
  Tourism employment exhibits high self-persistence, where the first and second lags {TOUR_EMP}(-1) and {TOUR_EMP}(-2) had a positive and significant impact on employment respectively. This aligns with the findings from available documents, which show that a (1%) increase in the number of workers in the tourism sector can

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lead to a (2.933%) increase in GDP confirming the central role of employment {t-statistic}= 2.43929 - 2.59019.

- **Tourism Revenues {TOUR_REV}**:

  Revenues possess very high self-persistence as the coefficient (\text{TOUR_REV}(-1)) was positive and highly significant {t-statistic}= 5.04320.

  The lagged tourism employment {TOUR_EMP}(-2)) showed a positive and significant impact on current revenues {t-statistic} = 2.00234.

  Furthermore, the lagged carbon dioxide emissions {CO2}(-1)) showed a positive and significant impact on tourism revenues {t-statistic} = 3.11858.

4- Impact of Tourism on Number of Trips {TR}:

- **Tourism Employment**:

  The lagged tourism employment {TOUR_EMP}(-1) had a positive and strongly significant impact on the current number of trips {t-statistic}= 3.41358 meaning that investment in human resources and their qualification in the tourism sector contributes to increasing the number of tourists and trips.

- **Tourism Revenues**:

  The tourism revenues coefficient {TOUR_REV}(-2)) had a negative and significant impact on the current number of trips {t-statistic} = -2.90889 This negative relationship may suggest that large and continuous increases in revenues (perhaps resulting from rising prices) in the past might lead to a decrease in the attractiveness of the tourist destination, and consequently a decline in the number of trips in the longer run.

- **Self-Persistence**:

  The lagged number of trips {TR}(-1)) had a positive and significant impact on the current number of trips {t-statistic} = 3.21616.

Section 3: Analysis of Economic and Environmental Impact on Tourism

First: Impact of Non-Oil GDP {GDP_NONOIL} on Tourism

1. **Impact on Revenues:**

   The coefficient for{GDP_NONOIL}(-1)) had a negative and significant impact on

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tourism revenues {TOUR_REV} which reached ((t-statistic} = -2.97526)) This result points to one of the following phenomena:

a. When the Non-Oil Gross Domestic Product rises significantly local investment and spending may shift towards other sectors that are more profitable in the short term thus reducing the focus on the tourism sector or economic growth may stimulate imports.

b. This may reflect a preference among domestic tourists (who are a significant segment of the local market) to travel abroad when the economic situation improves.

2. **Impact on Number of Trips:**

   The coefficient for{GDP_NONOIL}(-1)) had a negative and statistically significant impact on the number of trips {TR (t -statistic} = -2.34111).

3. **Reciprocal Environmental Impact:**

   Impact of Carbon Emissions {CO2} on Tourism and Economic Growth

   - **On Tourism/Economy:** The first lag of{CO2}(-1)) has a positive and significant impact on tourism revenues{TOUR_REV and on Non-Oil GDP{GDP_NONOIL} and the number of trips {TR} These results support the findings in the available documents regarding the trade-off between economic/tourism growth and environmental impact, as the current growth relies on activities that contribute to increased emissions (Summary of Document).
   - **Impact of Economy on{CO2})**: The first and second lags of Non-Oil GDP {GDP_NONOIL}(-1) and {GDP_NONOIL}(-2) showed a negative but marginally significant impact on {CO2}) emissions {-statistic}) between (-1.82) and (-1.86) This may indicate that the (lagged) Non-Oil economic growth is beginning to adopt more environmentally efficient practices or that there is a governmental focus on the green economy.

Second: Summary of Dynamic Interaction

The analysis reveals an integrated dynamic model of the studied variables as follows:

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1. **Tourism Self-Sustainability:** The tourism sector (employment and revenues) exhibits high self-persistence meaning its current success is the best predictor of its future success.
2. **Environmentally-Financed Growth:** Non-Oil economic growth, as well as tourism revenues shows dependence on emission-generating activities in the lagged periods highlighting the challenge of sustainable development.
3. **Domestic Competition Challenge:** High and rapid growth in Non-Oil GDP leads to a negative impact on tourism revenues and the number of trips in the subsequent time period This may require governmental intervention to ensure that investment or outward tourism spending is not dispersed.

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Table (11): Summary Analysis of Extracted Results

Feature	Extracted Value	Implication / Statistical Significance
Maximum Explanatory Power	{TOUR_EMP}{96.08%}	The model is very strong in explaining the dynamics of tourism employment and revenues.
Strong Persistence (Self-Impact)	{TOUR_REV}(-1) Impacts {TOUR_REV} with a value of ({t}=5.043)	Tourism revenues and tourism employment show high stability, as their current values are strongly affected by their lagged values.
Positive Impact of Employment on Revenues	{TOUR_EMP}(-2)) Impacts {TOUR_REV}	An increase in tourism employment two periods prior has a positive and significant impact on tourism revenues.
{CO2}) Impact on Non-Oil GDP	{CO2}(-1)) Impacts {GDP_NONOIL})	The relationship is positive and significant, indicating the synchronization of (non-oil) economic growth with increased emissions in the previous period.

Eighth: Normality Test

Figure (2): (Normality Test) Test

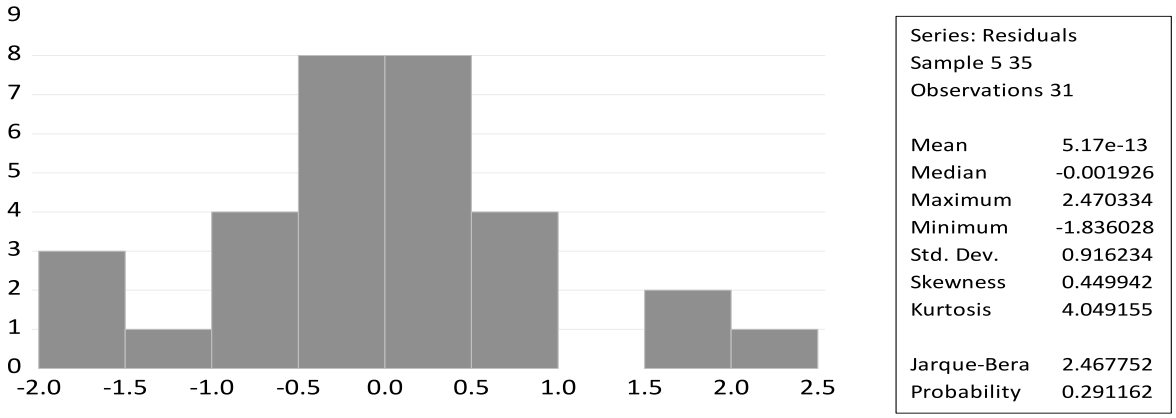

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Table (11): Interpretation of the Figure

Statistic	Value	Interpretation
Jarque-Bera	2.4677522.467752	The test statistic itself.
Probability	0.2911620.291162	The probability value, which is the decisive criterion for decision-making.
Skewness	0.4499420.449942	A positive value indicating that the distribution is slightly skewed to the right.
Kurtosis	4.0491554.049155	A value greater than (3) indicating that the distribution is more peaked {Leptokurtic} compared to the normal distribution (whose kurtosis value is (3).

Decision:-

Based on the results we accept the null hypothesis This means that the model residuals follow a normal distribution at a (5%) significance level.

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Ninth: Serial Correlation Test

Table (12): (Breusch-Godfrey Test)

Breusch-Godfrey Serial Correlation LM Test:

Null hypothesis: No serial correlation at up to 2 lags

F-statistic	6.773506	Prob. F(2,6)	0.2089
Obs*R-squared	21.48448	Prob. Chi-Square(2)	0.3010

Decision:-

Based on the table results, the model does not suffer from the problem of serial correlation.

Tenth: Homoskedasticity Test

Table (13): (Heteroskedasticity Test)

Heteroskedasticity Test: Breusch-Pagan-Godfrey

Null hypothesis: Homoskedasticity

F-statistic	1.286988	Prob. F(22,8)	0.3730
Obs*R-squared	24.17063	Prob. Chi-Square(22)	0.3383

Decision:-

Based on the table results, the model does not suffer from the problem of heteroskedasticity, and the model residuals are homoscedastic. This means that the standard errors of the model coefficients are unbiased.

Results and Recommendations of the Study

This study is an attempt to analyze the vital role of the tourism sector in the Kingdom of Saudi Arabia within the framework of achieving the desired Sustainable Development Goals of Vision 2030. The statistical soundness of the econometric model has been confirmed, which enhances the reliability of the results in light of the specified objectives and hypotheses.

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First: Analysis of the Main Hypothesis and General Objectives

1. Main Hypothesis: There is a positive and statistically significant correlation between the development of the tourism sector and the achievement of the dimensions of sustainable development (Economic, Social, and Environmental) in the Kingdom of Saudi Arabia under Vision 2030.

Support for the Hypothesis: The results largely support the main hypothesis, noting a variation in the environmental impact. The literature confirms that tourism is one of the fastest-growing sectors globally, and the Kingdom has relied upon it as a basic pillar of Vision 2030 for economic diversification. The Vision aims to attract 150 million visitors annually by 2030 and inject massive investments reaching 810 billion into mega-projects. Econometric analysis results showed that the model was strong and explains about (82.1%) of the changes in the Gross Domestic Product, indicating that tourism sector indicators are closely linked to aggregate macroeconomic variables, thus confirming the sector's comprehensive importance in achieving development.

Second: Linking Econometric Results to Sub-Hypotheses and Specific Objectives

1. First Sub-Hypothesis (Economic Dimension)

Hypothesis: The growth of the tourism sector, measured by increased revenues and tourism investments, contributes positively and directly to diversifying the economic base and to economic growth, as measured by the increasing contribution of the sector to the non-oil Gross Domestic Product.

Support for the Hypothesis: The econometric model results confirm a strong and statistically significant positive correlation between all tourism sector indicators (Revenues, Investment, and Employment volume) and economic growth, as follows:

- **Stimulating Employment Factor:** The volume of employment is considered the most influential indicator, where a (1%) increase in the number of workers in the sector leads to an increase in the Gross Domestic Product by up to (2.933%).

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Increase in Investments – Tourism investments (both private and public, as well as total fixed capital formation) are strongly positively linked to economic development, supporting the Kingdom's effort to build a prosperous, diversified economy that is less dependent on oil.

2-Sub-hypothesis (Social Dimension)

Hypothesis: Domestic and local tourism enhances the social dimensions of sustainable development by increasing employment in the sector, empowering women and youth, contributing to the development of local communities, and preserving cultural heritage.

Support for the hypothesis:

- **Social empowerment through employment:** The large impact of employment volume on GDP confirms the sector's contribution to job creation, a primary driver of the social dimension. Saudi Arabia has recorded progress in women's empowerment and increased female participation in the labor market.
- **Development of local communities:** The study shows that domestic tourism strengthens the social dimensions of sustainable development, with the "Education and Training" and "Social Participation" dimensions receiving the highest approval scores, indicating tourism's role in raising awareness and building human capital.
- **Preservation of cultural heritage:** Qualitative findings underscore the importance of protecting national and tourism heritage sites; this aspect received the highest average approval among sector-development proposals

3-Sub-hypothesis (Environmental Dimension)

Hypothesis: Adoption of environmentally friendly and sustainable tourism practices supported by Vision 2030 initiatives such as the Saudi Green Initiative, will have a positive impact on the protection of natural resources and the preservation of heritage and environmental sites in the Kingdom.

Support for the hypothesis: The econometric results reveal a strong negative correlation between overall investment including tourism and infrastructure investment and environmental development. This indicates that rapid economic and investment expansion currently intensifies environmental pressures such as higher carbon-dioxide emissions.

Support from Vision

Even though the econometric results show a negative relationship, the hypothesis remains

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supported by the institutional direction and Vision 2030 (through the Saudi Green Initiative) which aims to protect the environment and develop sustainable tourism projects such as the Red Sea Project The strategic positive impact of these initiatives has not yet appeared in the aggregate growth data.

Third: Main Challenges

Based on the ambition and the statistical impact, the following challenges emerge for sector development:

1. **Environmental-Financial Challenge** – Achieving a positive environmental effect requires a strict redirection of investment toward clean-technology solutions and low-carbon-footprint projects.
2. **Structural Labour Challenge** – Low localisation rates (Saudi employment) and weak female participation in total employment despite the strong positive influence of labour on GDP.
3. **Operational Challenge** – High costs of tourism programmes and a shortage of complementary services such as way-finding signage and comprehensive service centres.
4. **Institutional Challenge** – The need for better coordination among the various public and private entities operating in the tourism sector lack of coordination hampers integrated effort.

Fourth: Practical Recommendations

Based on the validated econometric model and its findings, the following recommendations are proposed to enhance the tourism sector's contribution to sustainability:

1. **Convert Negative Investment Impacts into Positive Environmental Outcomes**
    - Establish strict regulatory standards and require Environmental-Impact Assessments for all new tourism projects to ensure compliance with sustainability criteria.
    - Direct financial incentives toward sustainable eco-tourism ventures that directly protect natural resources, aligning with the Saudi Green Initiative.

2. Maximizing Economic Impact through Localization:

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- Focus on employment strategies that target national competencies, given the high elasticity demonstrated by the labor factor in raising the Gross Domestic Product.
- Intensify specialized training and qualification programs, such as preparing new generations and tourism cadres according to a scientific methodology and empowering youth and women in the sector.

3. Enhancing Institutional Integration and Experience Quality:

- Activate an effective partnership charter between the public and private sectors to reduce duplication in decisions and coordinate efforts.
- Work on developing tourism infrastructure and facilities, especially those suitable for low-income visitors, and provide a distinctive tourism experience for the tourist.

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