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Editorial

El crecimiento económico en Colombia

En todos los países, los objetivos de política económica son muy importantes. Sin duda, el crecimiento económico tiene mucha trascendencia, debido a que la actividad económica influye en muchos aspectos, entre otros, en la generación de empleo, en la reducción de la pobreza y en los ingresos del Estado. Además, como lo plantea Amartya Sen, aunque el crecimiento no es equivalente al desarrollo económico, sí es un medio para alcanzarlo.

El crecimiento en Colombia ha venido descendiendo, incluso desde antes de la pandemia del coronavirus. En el año 2020 bajó sustancialmente hasta -7,2 %; mientras que, en los años 2021 y 2022, repuntó considerablemente hasta alcanzar tasas del 10,7 y del 7,5 %, respectivamente. En estos dos últimos años, el alto crecimiento se explica, en gran parte, por las políticas monetarias y fiscales expansivas, como también por los favorables términos de intercambio y el aumento de las remesas. Empero, el crecimiento en 2023 fue de apenas 0,6 %.

El Banco de la República estimó para el presente año un crecimiento de 1,4 %. Por otra parte, el Gobierno, de acuerdo con el Plan Financiero de 2024, pronosticó un crecimiento de 1,5 %, pero en el Marco Fiscal de Mediano Plazo, documento que presentó el 14 de junio el ministro de Hacienda, Ricardo Bonilla, lo revisó al alza y lo ubicó en 1,7 %. Esta última cifra, según él, se puede alcanzar con una reducción gradual de la inflación, una política monetaria más flexible y un programa de reactivación económica que se implementará en el segundo semestre.

Por otro lado, la Organización para la Cooperación y el Desarrollo Económico (OCDE) considera que el crecimiento económico de Colombia será de 1,2 % en 2024; el Fondo Monetario Internacional (FMI) pronostica 1,1 % y el Banco Mundial (BM) estima 1, 3 %. Esta última institución, al revisar las proyecciones en los primeros días de junio, consideró que el crecimiento del 2,2 % que alcanzó América Latina en 2023 será menor en el presente año y es posible que pueda lograr 1,8 %, para repuntar en el 2025 y alcanzar un 2,7 %. En cuanto a América Latina, este organismo argumenta que estos bajos niveles de crecimiento en este año y el repunte en 2025 se pueden lograr en la medida en que baje la inflación y las tasas de interés se normalicen.

El BM, al referirse a la economía mundial, considera que crecerá a una tasa de 2,6 %, 0,2 puntos por encima de su estimación de principio del año y espera que en 2025 alcance un crecimiento de 2,7 %.

Las cifras sobre el crecimiento económico muestran que el bajo comportamiento de dicha variable no solo se presenta en Colombia, sino que es un fenómeno mundial. Desde luego, el caso de Colombia es más apremiante, lo que evidencia que el hecho de que la economía colombiana haya crecido solo al 0,6 % en el 2023 es algo preocupante, debido a que los pronósticos más pesimistas consideraban que la economía crecería 1.1 %.

Según el Departamento Administrativo Nacional de Estadística (DANE), en el primer trimestre de 2024 la economía creció en 0,7 %. Los sectores más afectados en el primer trimestre fueron la industria manufacturera (-5,9 %), actividades financieras y seguros (-3 %), información y comunicaciones (-1,6 %), explotación de minas y canteras (-1,5 %), comercio transporte y alojamiento (-0,8 %) y actividades profesionales y científicas (-0,2 %). Los sectores con un crecimiento notable fueron: agricultura (5,5 %), administración pública, educación y salud (5,3 %) y actividades artísticas y entretenimiento (5,2 %).

De hecho, es motivo de preocupación tanto para el Gobierno como para los gremios de la producción, el bajo crecimiento de 2023 y del primer semestre de este año. Por ello, Bruce Mac Master, presidente de la Asociación Nacional de Industriales (ANDI), plantea la necesidad de unir esfuerzos para dinamizar la economía: "llegamos al momento que nos toca plantear un pacto nacional por el empleo, la reactivación, la inversión y la prosperidad en el que nos comprometamos en hacer todo lo que esté a nuestro alcance por generar mayor empleo, generar equidad y oportunidades de trabajo, permitir que las condiciones para que la economía funcione se cumplan".

Como se mencionó atrás, el bajo crecimiento es un fenómeno mundial, pero en Colombia esta situación es más acentuada. Las causas de este fenómeno tienen diferentes explicaciones. Para algunos analistas, como Mauricio Cárdenas, Marc Hofstetter y Carlos Caballero, entre otros, la situación se explica por "la falta de confianza que ha afectado mucho la inversión". Según Cárdenas, "la inversión en Colombia normalmente era del 24 por ciento del PIB y ahora está en el 17 por ciento del PIB"; dicha desconfianza se debe, según él, "a que el gobierno con sus amenazas permanentes de reforma y de cambio, sus ataques a un sistema en el que el sector privado juega un papel importante en muchos sectores como la infraestructura, energía eléctrica, salud y las pensiones", conduce a una menor inversión del sector privado en los sectores antes enunciados y en otros, que contribuyen sustancialmente a la generación de empleo formal.

Para José Antonio Ocampo, el primer ministro de Hacienda de la administración Petro, el deterioro en la confianza inversionista se debe "básicamente al impacto de la crisis política. Por ponerlo de alguna manera. La sensación del sector privado de que el gobierno tiene políticas que no son adecuadas. Ese es el elemento de confianza".

Otros analistas como Kalmanovitz, González y Ocampo coinciden en que las altas tasas de interés del Banco de la República han afectado significativamente la inversión y le dan más importancia que otros (¿a este factor frente a otros factores? O: ¿ellos le dan más importancia a este factor que la que le conceden otros autores? Para Ocampo, la tasa de interés es importante y afecta la inversión. El otro factor, a su juicio, es la desaceleración de la demanda, puesto que la economía venía de un sustancial exceso de demanda, sobre todo en

los años 2021 y 2022, debido a las políticas monetarias y fiscales expansionistas, pero en 2023, comienza una menor presión de esta.

Dado que la desaceleración de la economía colombiana es una realidad, lo importante es implementar un programa de reactivación económica que logre el crecimiento potencial de la economía (2,7 %). Para ello, es necesario que haya un acuerdo nacional en el que participe el Gobierno, la academia, el sector privado y las organizaciones sociales, entre otros actores. Un elemento clave de dicho objetivo es la reducción de las tasas de interés fijadas por el Banco de la República, teniendo en cuenta que fue muy rápida la elevación de estas, al pasar de 1,75 % en agosto de 2021 hasta un 13,25 % en mayo de 2023, es decir, en menos de dos años. Esta última cifra se mantuvo hasta diciembre de 2023. Cabe recordar que durante el año 2023 la tasa de interés estuvo por encima del 12 %, y el descenso fue muy lento. En diciembre de 2023, el banco emisor la bajó al 13 % y solo en mayo del presente año la fijó en 11,75 %.

Sin duda, una tasa de interés tan alta afecta la inversión y el consumo, y, por lo tanto, los sectores sobre los cuales ha incidido más el alto costo del dinero han sido la construcción, la industria y el comercio. El argumento de la Junta Directiva del Banco de la República es que la inflación, si bien ha bajado, no lo ha hecho a un ritmo que posibilite una disminución más rápida de la tasa de interés. Sobre este punto sería interesante preguntarse si la inflación en Colombia está determinada por factores de demanda o de oferta. A nuestro juicio, ante un bajo nivel de crecimiento y un aumento del desempleo, la inflación es causada más por factores de oferta, con una gran influencia del componente internacional.

La necesidad de bajar la tasa de interés para estimular la inversión y el consumo no ha sido solo una preocupación del Gobierno, sino también de los gremios de la producción como la ANDI, la Sociedad de Agricultores de Colombia (SAC), la Federación Nacional de Comerciantes (FENALCO) y la ASOBANCARIA, entre otros. Los banqueros reunidos en la última convención gremial así lo manifestaron. Luis Carlos Sarmiento Gutiérrez, presidente de la Junta Directiva del Grupo AVAL, manifestó: “el Banco de la República del cual he sido respetuoso, se está excediendo en no bajar las tasas (de interés). Mi recomendación es que, si al bajarla hay un choque de inflación, pues si ocurre, que la vuelva a subir”.

Así las cosas, para reactivar la economía, además de bajar la tasa de interés, se debe incentivar la producción en sectores intensivos en la utilización de mano de obra, como la construcción (tanto de edificaciones como de obras civiles), ya que la construcción es un sector líder que impulsa otras actividades. Desde luego, también deben promoverse planes y programas que estimulen la industria, el comercio y el turismo, dado el potencial que estos sectores tienen en la generación de empleo y de valor agregado.

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Editorial

Economic growth in Colombia

In all countries, economic policy goals are very important. Undoubtedly, economic growth is very important because economic activity influences many aspects, including employment creation, poverty reduction, and government revenue. Moreover, as Amartya Sen notes, growth is not the same as economic development, but it is a means to achieve it.

Growth in Colombia has been declining, even before the coronavirus pandemic. In 2020 it fell substantially to -7.2%; while, in 2021 and 2022, it rose considerably to reach rates of 10.7 and 7.5%, respectively. In these last two years, the high growth is explained, in large part, by expansive monetary and fiscal policies, as well as by the favorable terms of trade and the increase in remittances. However, growth in 2023 was just 0.6%.

Growth in Colombia has been declining even before the coronavirus pandemic. In 2020, it fell sharply to -7.2%, while in 2021 and 2022 it rebounded significantly, reaching rates of 10.7% and 7.5%, respectively. In these last two years, the high growth is largely explained by expansionary monetary and fiscal policies, as well as favorable terms of trade and an increase in remittances. However, growth in 2023 was only 0.6%.

The Bank of the Republic estimated a growth of 1.4% for this year. On the other hand, the government, in accordance with the Fiscal Plan 2024, predicted a growth of 1.5%, but in the Medium Term Fiscal Framework, a document presented on June 14th by the Minister of Finance, Ricardo Bonilla, it was revised upwards and placed at 1.7%. This latter figure, according to him, can be achieved with a gradual reduction in inflation, a more flexible monetary policy and an economic reactivation program to be implemented in the second half of the year.

For its part, the Organization for Economic Cooperation and Development (OECD) believes that Colombia's economic growth will be 1.2% in 2024; the International Monetary Fund (IMF) forecasts 1.1% and the World Bank (WB) 1.3%. This last institution, when reviewing the projections in the first days of June, considered that the 2.2% growth that Latin America achieved in 2023 will be lower this year and it is possible that it could reach 1.8%, to recover in 2025 and reach 2.7%. As for Latin America, this organization argues that these low levels of growth this year and the rebound in 2025 can be achieved to the extent that inflation falls, and interest rates normalize.

The World Bank considers that the world economy will grow at a rate of 2.6%, 0.2 points higher than its estimate at the beginning of the year and expects to reach a growth of 2.7% in 2025.

The figures on economic growth show that the low performance of said variable does not only occur in Colombia but is a global phenomenon. Of course, the case of Colombia is more urgent, which shows that the fact that the Colombian economy will grow by only 0.6% in 2023 is somewhat worrying, given that the most pessimistic forecasts considered that the economy would grow by 1.1%.

According to the National Administrative Department of Statistics (DANE, by its acronym in Spanish), the economy grew by 0.7% in the first quarter of 2024. The sectors most affected in the first quarter were: manufacturing (-5.9%), financial activities and insurance (-3%), information and communication (-1.6%), mining and quarrying (-1.5%), trade, transport and accommodation (-0.8%) and professional and scientific activities (-0.2%). The sectors with notable growth were agriculture (5.5%), public administration, education and health (5.3%) and arts and entertainment (5.2%).

In fact, the low growth in 2023 and in the first half of this year is a cause for concern for both the government and the manufacturing unions. For this reason, Bruce Mac Master, president of the National Business Association of Colombia (ANDI, by its acronym in Spanish), raises the need to join forces to stimulate the economy: "We have reached the point where we must propose a National Pact for Employment, Reactivation, Investment and Prosperity, in which we commit ourselves to do everything in our power to create more jobs, to create equity and job opportunities, and to create the conditions for the economy to function."

As previously stated, low growth is a global phenomenon, but in Colombia, this situation is more pronounced. The causes of this phenomenon are subject to various explanations. For example, some analysts, including Mauricio Cárdenas, Marc Hofstetter, and Carlos Caballero, among others, attribute the situation to "the lack of confidence that has greatly affected investment." Cárdenas asserts that investment in Colombia was previously 24% of GDP but has since declined to 17%. He attributes this decline in investment to the government's persistent rhetoric of reform and change, as well as its criticism of the private sector's role in various sectors, including infrastructure, electrical energy, health, and pensions. This, he argues, has led to a reduction in private sector investment in these sectors and others that contribute significantly to the creation of formal employment.

In the view of José Antonio Ocampo, the inaugural Minister of Finance of the Petro administration, the decline in investor confidence is essentially attributable to the repercussions of the political crisis. To summarize, the private sector perceives the government's policies as inadequate. "That is the element of trust."

Other analysts, including Kalmanovitz, González, and Ocampo, concur that the elevated interest rates set by the Bank of the Republic have had a considerable impact on investment, affording it a greater degree of significance than other factors. Ocampo asserts that the interest rate is a significant factor that affects investment. The other factor is the slowdown in demand, which has been substantial in recent years, particularly in 2021 and 2022. This is due to the expansionary monetary and fiscal policies that have been in place. However, in 2023, this pressure begins to subside.

In light of the undeniable reality of the Colombian economy's deceleration, it is of paramount importance to implement an efficacious economic reactivation program that is capable of achieving the projected growth potential of the economy, which is estimated to be 2.7%. To achieve this, it is essential to establish a national consensus involving the government, academic institutions, the private sector, social organizations, and other key stakeholders. A crucial aspect of this objective is the reduction of interest rates set by the Bank of the Republic. Given the considerable increase in these rates, from 1.75% in August 2021 to 13.25%, it is essential to consider a reduction. By May 2023, that is, in less than two years. This last figure was maintained until December 2023. It is important to note that throughout 2023, the interest rate remained above 12%, with a gradual and relatively slow decrease. In December 2023, the issuing bank reduced the interest rate to 13%. It was only in May of this year that the bank set the interest rate at 11.75%.

t is evident that a high interest rate exerts a considerable influence on both investment and consumption, with the sectors most affected being construction, industry, and commerce. The Board of Directors of the Bank of the Republic posits that, despite the decline in inflation, the rate of decrease has not been sufficient to warrant a more rapid reduction in the interest rate. It would be interesting to ascertain whether inflation in Colombia is determined by demand or supply factors. It is our contention that, in the context of a relatively low level of economic growth and an increase in the unemployment rate, inflation is primarily driven by supply-side factors, with a significant international component.

The need to lower the interest rate in order to stimulate investment and consumption has been a topic of concern not only for the government but also for various production unions, including ANDI, the Society of Farmers of Colombia (SAC, by its acronym in Spanish), the National Federation of Merchants (FENALCO, by its acronym in Spanish), and ASOBANCARIA, among others. At the most recent union convention, bankers were among those who made a statement to this effect. Luis Carlos Sarmiento Gutiérrez, who serves as the president of the Board of Directors of Grupo AVAL, made the following statement: "The Bank of the Republic, of which I have been a respectful observer, is taking an excessive stance in not lowering interest rates." In the event of an inflationary shock, it would be prudent to raise the interest rate once more should the need arise.

Thus, to reactivate the economy, it is necessary to implement a reduction in interest rates and to encourage the production of goods and services in sectors that are intensive in the use of labor. One such sector is construction, which encompasses both buildings and civil works. Construction is a leading sector that promotes other activities, and therefore represents an important area for economic stimulus. It is similarly important to promote plans and programs that stimulate industry, commerce, and tourism, given the potential of these sectors to generate employment and added value.

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Presentación

Avances en la investigación de la economía global contemporánea

La economía global continúa evolucionando a un ritmo acelerado y con ella, la necesidad de comprender las complejidades y desafíos que enfrentan las diferentes industrias y regiones. Este número especial de la revista *Apuntes del Cenes* contiene una serie de artículos que exploran temas que abarcan la internacionalización, la sostenibilidad ambiental, la optimización de los costes informáticos, las prácticas de eficiencia de los sectores de servicios, inmobiliarios, agrícola y público, y reflejan los desafíos y las implicaciones de la investigación económica en el contexto global. Los nueve artículos reunidos, que se presentan a continuación, son resultado de investigaciones empíricas novedosas.

El impacto cualitativo de la inversión extranjera directa en la industria de la confección albanesa

El primer artículo de este número examina el impacto cualitativo de la inversión extranjera directa (IED) en la industria de la confección en Albania. Estudia la evolución de las empresas de confección extranjeras y proporciona una visión para mejorar la calidad de la producción textil y las oportunidades de desarrollo para las empresas. A través del análisis, el pronóstico y la abstracción, el artículo revela no solo los beneficios que recibe Albania a partir de la atracción activa de inversores, sino también las implicaciones para la innovación y el desarrollo sostenible en una economía emergente.

Internalización del entorno de inversión en la industria turística internacional

Este artículo determina el entorno de inversión en la industria del turismo con un enfoque institucional adaptativo y propone un índice integral de capital de inversión. La investigación proporciona una visión en la que un entorno de inversión favorable fomenta la internacionalización en la industria turística global cada vez más complejo y competitivo, y destaca las mejores prácticas y estrategias para asegurar una inversión efectiva y sostenible.

Aumento del EBITDA mediante la optimización de los costes informáticos

El tercer artículo ofrece un análisis detallado sobre cómo la optimización de los costes informáticos puede llevar a un aumento significativo del EBITDA (beneficio

antes de intereses, impuestos, depreciaciones y amortizaciones) y proporciona la ventaja de realizar comparaciones entre varias empresas a través de la replicación. La investigación destaca estrategias claves para mejorar la eficiencia operativa y reducir los costes en tecnología, lo cual proporciona herramientas a las empresas para maximizar su rentabilidad. Este estudio es relevante para las organizaciones que buscan equilibrar la innovación tecnológica con la necesidad de mantener un control riguroso sobre los costes.

Actitudes de los clientes sobre los servicios de banca electrónica: una encuesta en Albania

La banca electrónica ha transformado la forma en que los clientes interactúan con los servicios financieros. Por ello, este artículo evalúa la satisfacción bancaria en Albania y las limitaciones que afectan el desarrollo de servicios electrónicos. El estudio revela la expansión de servicios electrónicos y el aumento de comerciantes, por lo que se requiere mejorar la comunicación con clientes y reducir costos; ofrece una perspectiva valiosa para los bancos que buscan mejorar su oferta digital y adaptarse a las demandas cambiantes del mercado. Los hallazgos proporcionan una base sólida para el desarrollo de estrategias que optimicen la experiencia del cliente en el ámbito digital.

La sostenibilidad medioambiental en América del Sur

En los últimos años, la profusión creciente del desarrollo sostenible es una preocupación global ante la evidencia del cambio climático. El artículo compara prácticas y desempeño ambiental en 12 países sudamericanos, evalúa seis componentes claves de sostenibilidad y realiza un análisis multivariado jerárquico. La investigación revela diferencias significativas entre los países de la región en diversos aspectos analizados.

Un compendio en la adopción de leyes para el manejo de la sostenibilidad ambiental

Este estudio es esencial para comprender de qué manera las economías emergentes están abordando las cuestiones medioambientales. Para ello, agrupa los países de comportamiento similares e identifica los de mejor desempeño en el camino hacia la sostenibilidad.

Una nueva perspectiva sobre el sector inmobiliario en Tailandia en la era pospandémica

Tomando en cuenta que la pandemia ha tenido un impacto significativo en el sector inmobiliario a nivel mundial, este artículo ofrece una nueva perspectiva sobre las tendencias emergentes en la demanda y estrategias a inversores para operar eficazmente en el mercado. A través de un análisis de escenarios se examinan las oportunidades y desafíos actuales, a fin de proporcionar información valiosa para inversores y desa-

rrolladores que buscan entender el nuevo panorama inmobiliario y adaptarse a las condiciones pospandemia.

Evaluación de la eficiencia de la frontera estocástica en la recaudación fiscal: un análisis comparativo en entidades federativas mexicanas (2010-2020)

Este artículo se centra en evaluar la efectividad del impuesto sobre nómina y alojamiento en los 32 estados de México usando el panel de datos. El estudio comparativo entre entidades federativas proporciona una visión crítica acerca de la manera como se han gestionado los recursos fiscales y de qué tan eficaces han sido las políticas en diferentes regiones del país. Los hallazgos tienen implicaciones significativas para la formulación de políticas y la optimización de la recaudación fiscal en contextos variados.

El uso de los fertilizantes para la producción agrícola en el Valle del Cunas, Perú

Este artículo analiza cómo perciben los agricultores el uso de fertilizantes, a través de un enfoque cualitativo con el método hipotético deductivo y una muestra de 47 agricultores. Examina las prácticas actuales que revelan que los agricultores enfrentan dificultades para conseguir los fertilizantes y, ante esta situación, propone implementar estrategias gubernamentales para mejorar la accesibilidad y distribución de los fertilizantes, especialmente para maíz y papa, a fin de contribuir así a un desarrollo agrícola más sostenible.

Asentamientos informales en Colombia: una mirada a la ciudad de Tunja

Este número especial cierra con un estudio sobre los asentamientos informales en Colombia, concretamente en la ciudad de Tunja. El artículo examina las condiciones y desafíos de estos asentamientos, como los factores históricos, sociales y económicos que influyen en la región, y proporciona una visión integral de las políticas urbanas y las necesidades de infraestructura. Utiliza los enfoques descriptivo y explicativo para analizar los datos. En suma, este estudio es esencial para diseñar estrategias efectivas que aborden los problemas de vivienda y urbanización en contextos de rápido crecimiento poblacional.

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Presentation

Advances in Research on the Contemporary Global Economy

As the global economy continues to evolve at an accelerated pace, so does the need to understand the complexities and challenges faced by different industries and regions. This special issue of the journal Apuntes del Cenes presents a series of articles that explore topics such as internationalization, environmental sustainability, optimization of IT costs, efficiency practices in the services, real estate, agricultural and public sectors, and reflect on the challenges and implications of economic research in a global context. The nine collected articles presented below are the result of novel empirical research.

The Qualitative Impact of Foreign Direct Investment on the Albanian Clothing Industry

The first article in this issue examines the qualitative impact of foreign direct investment (FDI) on the clothing industry in Albania. It studies the development of foreign garment companies and provides insights into improving the quality of textile production and development opportunities for companies. Through analysis, forecasting, and abstraction, the article reveals not only the benefits that Albania receives from actively attracting investors, but also the implications for innovation and sustainable development in an emerging economy.

Internalizing the Investment Environment in International Tourism

This paper employs an adaptive institutional approach to assess the investment environment in the tourism industry and proposes a comprehensive investment capital index. The research sheds light on the way a favorable investment environment spurs internationalization in the increasingly complex and competitive global tourism industry. Furthermore, it elucidates optimal practices and strategies to guarantee effective and sustainable investment.

Increase EBITDA by Optimizing IT Costs

The third article provides a detailed analysis of how IT cost optimization can lead to significant increases in EBITDA (earnings before interest, taxes, depreciation and amor-

tization) and offers the benefit of cross-company comparisons through replication. The research highlights key strategies for improving operational efficiency and reducing IT costs, providing organizations with the tools to maximize profitability. The study is relevant to organizations seeking to balance technological innovation with the need to maintain tight control over costs.

Customer Attitudes towards E-banking Services: A Survey in Albania

The advent of e-banking has significantly impacted the manner in which customers engage with financial services. Accordingly, this article assesses banking satisfaction in Albania and the constraints affecting the development of e-services. The study reveals the expansion of e-services and the increase in merchants, which requires improved communication with customers and cost reduction. It offers valuable insight for banks seeking to improve their digital offering and adapt to changing market demands. The findings provide a robust basis for the formulation of strategies aimed at optimizing the customer experience in the digital domain.

Environmental Sustainability in South America

In recent years, the proliferation of sustainable development has emerged as a significant global concern, particularly in light of mounting evidence indicating the existence of climate change. The article compares the environmental practices and performance of 12 South American countries, assesses six key components of sustainability, and performs a hierarchical multivariate analysis. The research findings indicate notable discrepancies between countries in the region with regard to the various aspects under analysis.

A Compendium on the Adoption of Environmental Sustainability Management Legislation

This study is essential to understanding how emerging economies are addressing environmental issues. It groups countries with similar behaviors and identifies the best performers on the path to sustainability.

A New Perspective on Thailand's Real Estate Sector in the Post-pandemic Era

In light of the profound impact of the pandemic on the global real estate sector, this article presents a novel perspective on emerging trends in demand and strategies for investors to navigate the market effectively. A scenario analysis is employed to examine the current opportunities and challenges, thereby providing valuable insights for inves-

tors and developers seeking to understand the new real estate landscape and adapt to post-pandemic conditions.

A Comparative Analysis of Mexican Federal Entities to Evaluate the Efficiency of the Stochastic Frontier in Tax Collection (2010-2020)

This article employs panel data to assess the efficacy of the payroll and lodging tax in the 32 states of Mexico. The comparative study across states offers invaluable insight into the management of fiscal resources and the efficacy of policies in disparate regions of the country. The findings have significant implications for the formulation of policy and the optimization of tax collection in a variety of contexts.

The Use of fertilizers in Agricultural Production in the Cunas Valley, Peru

This article analyses how farmers perceive the use of fertilizers, by means of a qualitative approach, the hypothetical deductive method and a sample of 47 farmers. It examines current practices that reveal that farmers face difficulties in obtaining fertilizers and, in light of this situation, proposes implementing government strategies to improve the accessibility and distribution of fertilizers, especially for maize and potatoes, in order to contribute to a more sustainable agricultural development.

A Look at Informal Settlements in the City of Tunja, Colombia

This special issue concludes with an investigation of informal settlements in Colombia, with a particular focus on the city of Tunja. The article examines the conditions and challenges of these settlements, as well as the historical, social, and economic factors that influence the region. It also provides a comprehensive overview of urban policies and infrastructure needs. The study employs a descriptive and explanatory approach to analyze the data. In conclusion, this study is fundamental to the development of effective strategies for addressing housing and urbanization issues in contexts of rapid population growth.

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COLABORACIONES ESPECIALES

Il cavaliere dello spirito occidentale (Western Horseman) (1917), oil on canvas

Research article

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The Qualitative Impact of Foreign Direct Investment in the Albanian Clothing Industry

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Abstract: The objective of this article is to examine the long-term impact of foreign direct investment (FDI) on the garment industry in Albania. The main methods used were analysis, forecasting, and abstraction. The qualitative impact of FDI on the garment industry in Albania was examined. The benefits that Albania receives from actively attracting investments were described, and recommendations were given to improve the quality of clothing production in the country by foreign companies. This article presents an analysis of the evolution of foreign clothing companies in Albania, based on a series of data sources that provide qualitative and quantitative information on the country's clothing industry. A vision of the qualitative impact of foreign direct investment and industrial advances is presented. The study showed that the Albanian government is actively attracting foreign direct investment to develop the clothing industry, recognizing its potential as a catalyst for economic growth. The country's trade policy has been aligned with World Trade Organization standards and there are incentives within the sector to develop such enterprises.

Keywords: macroeconomics, finance, international relations, public policy, clothing production, Albania.

JEL Classification: B22, F65, J38, E64, F42.

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El impacto cualitativo de la inversión extranjera directa en la industria de la confección albanesa

Resumen

El objetivo de este artículo es examinar el impacto a largo plazo de la inversión extranjera directa en la industria de la confección en Albania. Los principales métodos utilizados fueron el análisis, el pronóstico y la abstracción. Se examinó el impacto cualitativo de la inversión extranjera directa en la industria de la confección en Albania. Se describieron los beneficios que Albania recibe de la atracción activa de inversiones y se dieron recomendaciones para mejorar la calidad de la producción de prendas de vestir en el país por parte de empresas extranjeras. En el artículo se analizó la evolución de las empresas extranjeras de la confección en Albania, basándose en una serie de fuentes de datos que proporcionan información cualitativa y cuantitativa sobre esta industria en el país. Se presentó una visión del impacto cualitativo de la inversión extranjera directa y de los avances industriales. El estudio mostró que el gobierno albanés está atrayendo activamente la inversión extranjera directa para desarrollar la industria textil, reconociendo su potencial como catalizador del crecimiento económico. La política comercial del país se ha alineado con las normas de la Organización Mundial del Comercio y existen incentivos dentro del sector para desarrollar este tipo de empresas.

Palabras clave: macroeconomía, finanzas, relaciones internacionales, políticas públicas, producción de prendas de vestir, Albania.

INTRODUCTION

Foreign direct investment (FDI) is defined as an investment made by foreign companies in domestic enterprises with the objective of gaining control of the business or obtaining considerable profits. The most significant characteristic in this context is the first, namely the acquisition of control, which is achieved by obtaining more than 50% of the company's ownership. In general, these investments may include the establishment of new businesses, the acquisition of stakes in existing companies, or the investment in other assets such as real estate. This type of investment is often understood to mean the purchase of significant amounts of equipment and the construction of an enterprise within a particular country. Nevertheless, this is not a mandatory requirement, as it is possible to be considered a direct investor even if one owns a considerable number of shares, namely, over 50% of the shares (Madiyarova et al., 2019; Paul and Feliciano-Cestero, 2021). In light of the aforementioned role of foreign direct investment, it is of paramount importance to consider it in a multitude of countries and industries. This study sought to assess the long-term effects of FDI in Albania's clothing industry. By focusing on these enterprises, it is possible to identify the benefits that the host country has received from their operations and what they may leave behind if they decide to relocate and move their production to another host country. The rationale for selecting the clothing industry is that it was a pivotal sector in the initial stages of industrialization and is a significant source of employment.

Many scholars have analysed Albania's current development and foreign direct investment in the country. Thus, Hoxhaj and Pulaj (2022) reviewed foreign direct investment. They showed that FDI has played a significant role in the country's economy over the years. However, they did not focus on the specific sectors in which FDI is attracted and the impact it can bring to the country in the long run. Lleshaj and Korbi (2019) also assessed the potential for foreign direct investment growth in Albania. They investigated indicators such as gross domestic product (GDP) and GDP per

capita, and business taxes and made recommendations in terms of government policy in this area. Konstandina and Gachino (2020) examined the role of FDI in the context of the investment transfer process. In their conclusions, the researchers demonstrated the role of foreign direct investment in the manufacturing sector in Albania, yet did not provide guidance on the implementation of the country's policy. Hobbs et al. (2021) investigated the impact of foreign direct investment on trade and economic growth in Albania. They pointed out the existence of a long-term relationship between these variables, as well as the increase in the efficiency of the economy in the case of stimulating FDI inflows. Cakerri et al. (2020) conducted an econometric analysis of the relationship between foreign direct investment and economic growth in countries. The researchers identified a long-term relationship between these two variables and discussed the role of the government in developing policies to encourage and increase the inflow of foreign direct investment.

The purpose of this study is to analyze the current state of the clothing industry in Albania in the context of foreign direct investment in it. This will facilitate the investment of funds in the industry by investors and government officials, as well as the formulation of policy in the industry.

MATERIALS AND METHODS

The study employed a variety of statistical data sources. For instance, some data was obtained from the Statista (2023) platform regarding the level of revenue of companies operating in the Albanian clothing industry, as well as the changing roles of online and offline sales in this sector. However, the study was unable to identify any publicly available data on the specific volumes of foreign direct investment in the Albanian clothing industry. Therefore, it was necessary to estimate the total volumes of FDI and its share of GDP, which were obtained from the World Bank (2023a; 2023b) databases.

The overarching methodology used in this study was systematic, enabling the examination of the facts (the impact of foreign direct investment on the clothing industry) within a single integrated system, where the various factors interact with each other. The utilization of such a systemic model enhances the reliability and realism of the conclusions drawn within the framework of this research.

Furthermore, the study employed a diverse array of research methods. The analysis method was applied to consider a substantial quantity of both quantitative and qualitative data in order to assess the impact of foreign direct investment (FDI) on the development of Albania's clothing industry. The historical method was also utilized, examining

the last several decades to understand what has influenced the current state of the clothing industry. Abstraction was employed to isolate and evaluate the interaction of only the most critical factors, thereby enabling the determination of the presence or absence of relationships between them. Forecasting techniques were applied to generate estimates of future developments in the Albanian clothing industry, based on the available data. All calculations within the study were performed using Microsoft Excel.

It should be noted that the study is subject to certain limitations that must be taken into account. This paper presents a qualitative analysis of the impact of foreign direct investment, as opposed to a quantitative one. Although some statistical data was used to draw conclusions, the analysis is predominantly general in nature. Therefore, increased openness of statistical data in Albania would improve the effectiveness of such studies in the future. Additionally, the research focused on the clothing industry as a whole, rather than examining individual enterprises. It is crucial to acknowledge that the circumstances may differ considerably between individual companies within the sector.

RESULTS

In general, economic growth can be defined as the process of increasing GDP and other indicators of a country's development over an extended perios, wich is associated with technological and social advances. Productivity is intricately linked to how the workforce is integrated with other production components, how efficiently equipment is used and how new knowledge is incorporated into operational processes (Khashimova et al., 2020). In order to guarantee the installation of equipment, it is essential to attract investment in the company and to create an environment conducive to the implementation of such innovations by entrepreneurs. Economic growth is often accompanied by an increase in labor productivity, which allows for the generation of more output with fewer inputs. This can be attributed to technological innovation, enhanced managerial practices, and the development of employee competencies. It also helps to create new jobs and reduce unemployment, after which increased production requires more workers (Azim et al., 2020). Often, such changes are accompanied by an increase in the population's income, which can improve living standards and provide more opportunities for living and investing (Trusova et al., 2021). It is noteworthy that economic growth can manifest in a multitude of forms and affect a diverse array of societal sectors. The clothing industry is often considered the initial phase of industrialization and a significant source of employment in developing countries. It has a manufacturing nature, which means that it requires considerable manual or machine work operations, often performed by numerous employ-

ees (Kataeva et al., 2019). Furthermore, this industry often covers various stages of production, including the supply of raw materials, processing, sewing and sales of finished products and thus contributes to the creation of added value in the country and the formation of global value chains. The development of the clothing industry often leads to the creation of small and medium-sized businesses, which can have an incredibly positive impact on the country's economy. Regarding the industrialization induced by foreign direct investment in the Albanian apparel sector, this study introduces a framework for assessing whether apparel firms have been exempted from FDI restrictions (Mugauina et al., 2020). The industry itself covers a wide range of products, from clothing to underwear, footwear, accessories and textile materials. It stays labour-intensive, as it often requires a lot of manual labour, including sewing, embroidery and fabric processing.

The apparel and footwear industry in Albania is characterized by low labour costs and faces competition from cheaper Asian producers (Nesterenko, 2023). Footwear and clothing dominated exports until 2008, after which it declined slightly, but is still an important part of foreign trade. The country's enterprises are mostly owned by shareholders from Italy, Germany and Greece (in the form of organizations such as Konfindustria, Business Albania, The Chamber of the Albanian Facons), which have brought the latest technologies to the country, upgraded equipment and improved the skills of local workers (Loi, 2023). The textile and footwear industry has made a significant contribution to the Albanian economy in terms of trade, GDP and employment.

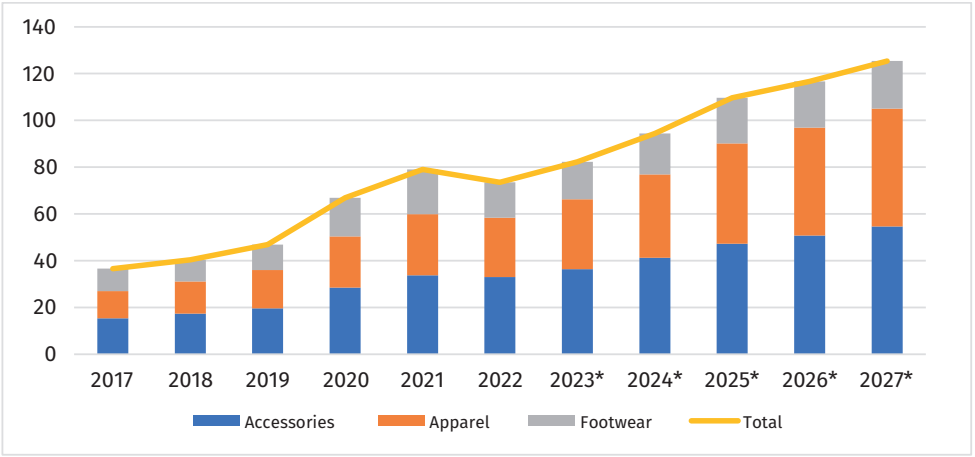
The Albanian government itself promotes foreign direct investment in the country. Its trade policy is guided by the principles of the World Trade Organisation (WTO), as well as individual trade agreements such as Central European Free Trade Association (CEFTA). The government is also taking steps to stimulate and support the industry: these include a symbolic rent of €1, accelerated value-added tax (VAT) refunds and the removal of customs barriers. Furthermore, a 5% income tax refund is also available to stimulate employment and social security and health insurance for new employees (European Commission, 2015). However, these incentives have been criticized because they still do not adequately address working conditions and workers' rights. The main export destinations for clothing and footwear produced in Albania are Italy, Spain, Germany, Greece, Kosovo and the United States, with brands such as Bata, Zara, Tods. The industry operates the Trade Union of Textile, Leather and Clothing Industry, which is part of the Confederation of Trade Unions of Albania. The composition of the workforce in the apparel and footwear industry varies between regions. The

largest number of employees is found in Tirana, followed by Durres, Škoder, Leger, Fier and Vlora. The average age of workers in the industry is 31 and the work often involves operating heavy equipment. The informal sector of the textile and footwear industry is a problem for Albania, as it is estimated that about half of the economy operates informally. In this regard, the state is taking steps to reduce the number of unregistered workers (Arqimandriti et al., 2016).

The apparel and footwear industry in Albania has several strengths and weaknesses. Albania's favourable location, good infrastructure and low labour costs make it attractive for export-oriented investments (which have already been successfully attracted in the past). The benefits of investing in the apparel industry in Albania include a skilled and flexible workforce, lower labour costs compared to neighbouring countries, a favourable geographical location with easy access to European markets and no VAT or customs duties. However, the industry faces several gender issues. Women employed in this sector often face economic and social challenges and work in difficult conditions. They may experience fear, work in unsafe conditions and experience discrimination. Although trade unions try to protect the country's population from this, they are not always successful (Ashraf & Prentice, 2019). A common complaint is that salaries are insufficient to ensure a decent standard of living. Compliance with workplace regulations can sometimes be dangerous for employees (e.g., they may be exposed to toxic substances while working), which can also affect the willingness of foreign investors to invest in a company (Butenko et al., 2023).

Local companies have faced significant challenges during the COVID-19 crisis. The pandemic led to a sudden drop in demand and supply chain disruptions, forcing many international retailers to cancel orders (Wardana & Darma, 2020; Przybyłowski et al., 2022). Exports to Italy, the country's main trading partner, have also become increasingly complex. The pandemic has also had a major impact on factory workers who have lost their jobs or have been forced to work for less. During the pandemic, some companies switched from fashion to personal protective equipment, although this did not fully compensate for their losses. The pandemic has also prompted companies to review their supply chains, potentially leading to "offshoring" (moving production and the business closer to the main hub) to countries such as Albania to increase supply chain resilience. As COVID-19-related restrictions have been lifted, Albania's industrial sector has been gradually recuperating and is currently at a level comparable to that observed prior to the onset of the crisis.

Some data on the development of the apparel industry in Albania are presented on Figure 1.



Note: * – the value is a forecast.

Figure 1. Revenues of Companies in the Apparel Sector in Albania from 2017 to 2022 and forecast until 2027, USD million.

Source: Compiled by the authors of this study based on data from Statista (2023).

As Figure 1 shows, the profits of companies in this sector have been gradually and steadily increasing between 2017 and 2022, with the highest growth rates in the clothing industry. It is also worth paying attention to the forecast made by Statista (2023) (considering the risks from the beginning of the war in Ukraine), which expects companies' revenues to grow in the future. The ongoing conflict in Ukraine has the potential to influence investment decisions in Albania, particularly in light of the broader implications for global markets and investor confidence. Investors may adopt a more cautious and restrained stance, resulting in a decrease in foreign direct investment in Albania. In addition, the conflict in Ukraine could potentially affect production in Albania if the country depends on supplies or markets that are disrupted by the war, leading to disruptions in trade routes or supply chains. The positive expectations derived from such assessments provide a foundation for optimism regarding the industry's substantial potential for future growth. It is also worthwhile to evaluate the data presented in Figure 2.

As illustrated in Figure 2, the share of online payments in the total number of payments in Albania is gradually increasing, which indicates a reorientation of the sector and its overall development. Nevertheless, it is still insignificant, which suggests the need to formulate government policies to promote more active development of online sales in the future.

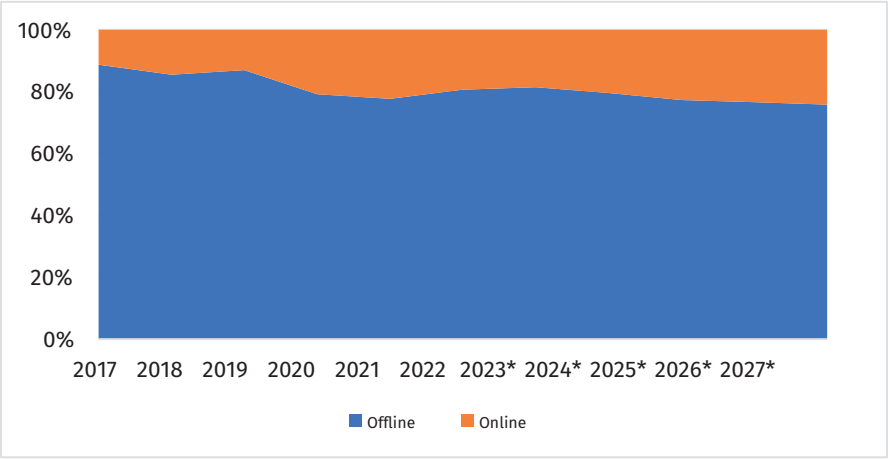


Figure 2. The Share of Offline and Online Sales of Garment Products in Albania between 2017 and 2022, and forecast to 2027

Source: Compiled by the authors of this study based on data from Statista (2023).

As mentioned above, there is limited data on the volume of foreign direct investment in the apparel industry in open sources. It is possible to find a certain relationship between the indicators of total FDI and the performance of industries. Figure 3 presents the data on the volume of foreign direct investment and its ratio to GDP.

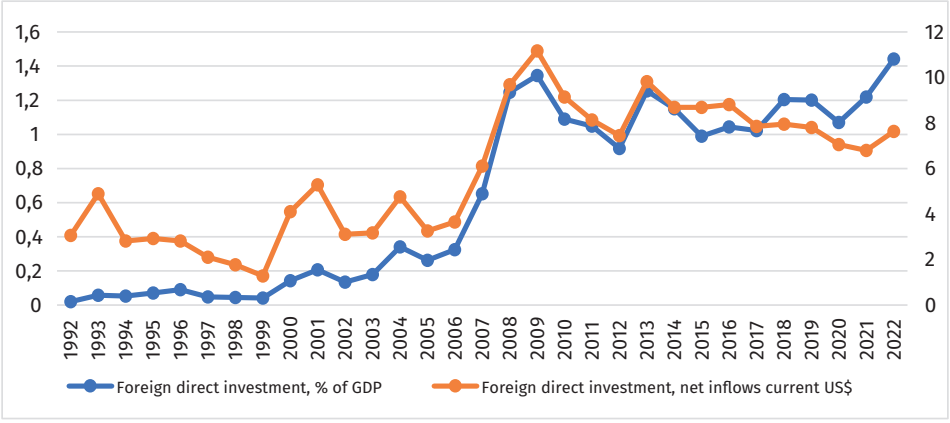


Figure 3. Foreign Direct Investment and Its Share in GDP in Albania from 1992 to 2022

Source: Compiled by the authors of this study based on World Bank (2023a; 2023b).

As Figure 3 shows, the volume of foreign direct investment in the country as a whole has been increasing over time. Moreover, this applies to both total volumes and share in GDP, which is vital in the assessment. This can serve as evidence that foreign direct investment is indeed having a positive impact on the development of the fast-growing apparel industry in Albania, as presented on Figures 1 and 2.

Thus, it can be generally concluded that foreign direct investment has a positive impact on the apparel industry in Albania. This is done through many components. For instance, this is facilitated by technological upgrades, which are driven by the entry of new technologies into the sector along with considerable amounts of money. This allows for increasing productivity and product quality. Furthermore, the newly constructed production facilities provide enhanced access to global markets and buyers, thereby facilitating the export of Albanian garment products. The funds received can also be used to train people, i.e., improve the country's human capital, which also has a considerable positive impact on the long-term development of the economy (Wida Riptanti et al., 2024). Overall, this makes the country more competitive in the international arena. Government policy should be aimed at further increasing the country's investment attractiveness to be able to attract foreign investors' funds to the country more actively. Although certain types of incentives already exist, they are insufficient to meet the current needs of the industry. Moreover, it is still important to improve the social conditions of workers at garment enterprises.

DISCUSSION

Foreign direct investment in host countries has attracted considerable attention from academics, governments and the public, with differing opinions on how it affects economic development and long-term sustainable growth. The impact of foreign direct investment (FDI) is typically classified into two categories: quantitative effects and qualitative effects. Quantitative effects refer to the immediate, short-term impacts on the macroeconomic performance of the host country. Qualitative effects, on the other hand, encompass the long-term technological and financial externalities that arise from the presence of FDI in the host country (Madiyarova et al., 2018). Notably, the overall impact of FDI on the host country is context-specific and depends on several factors.

Wang et al. (2022) conducted a review of a considerable number of studies on the impact of foreign direct investment. Their paper provided insight into the historical development, key players, influential journals, global representation and thematic evolution in the field. Scientists described the relevance of research on this topic, both in developed and developing countries. Yue (2022) investigated the impact of foreign direct investment on the innovative efficiency

of Chinese local manufacturing enterprises in the early 2000s. The researcher concluded that FDI has a considerable positive impact on highly productive enterprises, but less so on low-productive ones. Thus, they are beneficial for capital-intensive enterprises in terms of developing innovative productivity. Export companies also benefited from foreign direct investment. Based on this, the scientist formulated a recommendation for state policy, which proposed the creation of incentives for investing in innovative technologies to attract even more funds to the sector. In general, similar recommendations were made in the present study for companies in Albania. Nevertheless, the creation of additional incentives for innovative enterprises is particularly effective, given that innovations will allow for more efficient results for industries in the long run.

In a recent study, Navarro and Álvarez-Quiroz (2022) examined the relationship between foreign direct investment (FDI) and economic growth in Peru. The findings indicate that an uptick in FDI can have a favorable or unfavorable impact on GDP, contingent on the comparative incline of specific curves. Specifically, the study concludes that an increase in FDI leads to GDP growth in both the short and long run, indicating an elastic relationship between the two variables. Based on this, the authors propose that Peru's economic policy should be aimed at attracting foreign capital to increase FDI. Comparable results were obtained in the present paper upon analysing foreign direct investment in Albania and recommendations were made to the government authorities to improve the investment climate in the country. Peters et al. (2021) assessed the current state of the fashion industry in terms of greenhouse gas emissions. Scientists noted that emissions in this area are currently at their highest levels and the countries with the highest emissions are China, India, the United States and Brazil. The reason for this is the so-called "fast" fashion, when certain things cease to be popular quickly enough, which leads to the need to produce them in massive quantities. In order to address this issue, it is necessary to direct efforts towards interventions within the clothing life cycle. This could include strategies to improve the efficiency of production processes, reduce consumption and promote the use of end-of-life clothing to replace raw materials: industry, the public and non-governmental sectors should work together to encourage consumers to buy less clothing. Although this may cause some damage to the industry, policy components can be introduced to minimize such negative effects. Notably, Albania specializes in the production of clothing, including branded clothing. Thus, the country has good opportunities to combine "green" production and still have a strong position in the international market.

Swazan and Das (2022) investigated the production of ready-made clothing in Bangladesh. The scientists described the role of the industry's influence on the country's economic development, which allowed it to rise to the level of a middle-income country. The main reason for this was the competitive price and the ability to deliver products to their main customers on time . Furthermore, Islam et al. (2020) and Talapatra et al. (2020) studied government policies aimed at increasing exports and reducing local taxes played a significant role. The study showed that the clothing industry can indeed serve as a significant driver of a country's development and positively influence its long-term growth rates. In Albania, the clothing industry is also still one of the main sources of exports and gross domestic product. Considering the experience of other countries, one can expect that the role of this sector in the country will increase to a certain point, after which other industries, such as mechanical engineering, will take the lead.

Calabrese and Balchin (2022) investigated foreign investment and its impact on the clothing industry in Africa and Asia. The researchers showed that foreign investors play a major role in the initial stage of development of the clothing industry in developing countries but have a varying impact on modernisation depending on their characteristics and interaction with the local industry. Thus, investors who, along with investments, create new innovative production models have a positive impact on the development of the industry, but there are cases when there is no modernization and therefore no positive impact from it. The researchers observed that domestic firms play a pivotal role in influencing the industrial environment and advocating for government incentives to facilitate industrial modernization. As previously noted, foreign direct investment has played a significant role in the development of the clothing industry in Albania. Nevertheless, domestic firms should retain a substantial portion of domestic production. Consequently, government officials should consider this when formulating their policies. Meyer et al. (2021) investigated the working conditions of women garment workers in Ethiopia. They noted that there are considerable employment issues in the country in this area, specifically due to the onset of the COVID-19 crisis. Therefore, it is important to support employees of enterprises and ensure better working conditions for them. This is generally true for Albania, where there are still problems in terms of the quality of existing jobs in the clothing industry.

Consequently, a number of recommendations can be formulated with regard to the development of the clothing industry in the country. It is of the utmost importance to continue to improve the investment climate, enhance the working conditions at such enterprises,

develop infrastructure and technology, and facilitate international trade. This can be achieved through government guarantees for foreign investors and manufacturers in the clothing industry, direct injections of funds into the industry, or other methods (tax breaks or lower lending rates for them). While these measures are likely to have a positive impact on the development of the industry, their implementation may prove challenging. The effectiveness of the state's actions may be limited, or they may inadvertently harm other industries. This is because the redistribution of funds through the budget often has a negative impact on the overall development of the state.

CONCLUSIONS

Thus, economic growth is a multifaceted process that is characterized by qualitative changes and restructuring of the nation's economy. Albania, like many other countries, has experienced this transformation through the lens of its developing clothing industry. Often considered to be the initial phase of industrialization, the industry has played a significant role in creating employment opportunities and contributing to economic development, both in terms of trade and gross domestic product. The study showed that the Albanian government is actively attracting foreign direct investment to develop the clothing industry, recognizing its potential as a catalyst for economic growth. The country's trade policy has been aligned with World Trade Organisation standards and there are incentives within the sector to develop such enterprises.

The analysis showed that foreign direct investment has brought many positive benefits to the country, which was confirmed by statistical data, despite its limited publicly available sources. Thus, foreign investors, mainly from Italy, Germany and Greece, brought advanced technologies and investments to the country, improving the infrastructure, equipment and skills of the local workforce. This has had a positive impact on the development and growth of the industry, but despite this, such enterprises often face problems related to gender equality, employee rights and working conditions, among other things. The role of trade unions in the country is still insignificant, which precludes the possibility of entirely avoiding these difficulties. This is one of the factors that can influence an investor's decision to invest in a country and therefore requires more attention. Furthermore, the COVID-19 pandemic has had a considerable impact on the industry, causing disruptions in supply chains and a decline in demand. Despite these challenges, the sector has demonstrated resilience and adaptability. As restrictions have been lifted, it has shown rapid signs of recovery.

The Albanian government should continue to focus on improving the overall investment climate in the country to make it more attractive for

foreign investors. This could include measures such as providing tax incentives, reducing bureaucratic barriers, and improving the legal and regulatory framework for businesses. Specific to the clothing industry, the government could consider offering special incentives like subsidized rental rates, fast-tracked approvals, and customs duty exemptions for foreign companies setting up manufacturing facilities in the country. Additionally, the government should work on upgrading the country's physical and digital infrastructure to facilitate efficient logistics and supply chain operations for clothing manufacturers. Investing in modern transportation networks, reliable electricity and water supply, and high-speed internet connectivity would help address some of the key concerns foreign investors may have about operating in Albania.

It is of significant importance that the government should also prioritize policies that improve labor regulations and working conditions in the clothing industry. The implementation of measures designed to ensure compliance with international labor standards, the provision of skills training programs, and the reinforcement of worker protections would not only benefit employees but would also enhance Albania's reputation as an attractive destination for socially responsible foreign investment in the sector. Collaborating closely with industry associations and labor unions could help the government develop a balanced approach to labor regulations that meets the needs of both workers and businesses. By implementing a comprehensive set of investment-friendly and worker-centric policies, the Albanian government can position the country as a preferred destination for foreign direct investment in the clothing manufacturing industry, ultimately driving long-term economic growth and development.

It is crucial for future research to examine the influence of foreign direct investment on other industries in Albania, beyond the clothing industry. An assessment of foreign practices, particularly those of developed countries, in influencing state policy in the field of foreign direct investment remains a pertinent area of study.

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DECLARATION OF CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest to disclose.

AUTHORS CONTRIBUTION

Jonida Teta and Eralda Xhafka equally contributed to writing original draft, investigation, methodology and visualization. Jonida Teta was responsible for conceptualization, data curation as well as review and editing.

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Internalization of the Investment Environment in the International Tourism Industry

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Abstract: The article presents an adaptative-institutional approach to determining the investment environment in the international tourism industry.

The amount of foreign direct investment flows from international corporations to the tourism industry is analyzed. An integral index of the investment of investment capital (assets) of international corporations in the economic system of the country according to the high and low level of development of the tourism industry is proposed and calculated.

The article concludes upon the necessity to create a favorable investment environment to stimulate Internalization of the Investment Environment in the International Tourism Industry further growth of tourist flows and infrastructure development. The volume of foreign direct investment in the tourism industry showed that these investments are balanced through a system of countercyclical regulation, which considers the requirements of the global economic system.

Keywords: international corporations, international tourism industry, investment risks, investment capacity, global economic system.

JEL Classification: F01; G3; L83; E22; Z3.

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Internalización del entorno de inversión en la industria turística internacional

Resumen: El artículo presenta un enfoque institucional de adaptación para determinar el entorno de inversión en la industria del turismo internacional.

Se analiza la cantidad de flujos de inversión extranjera directa de las corporaciones internacionales a la industria del turismo. Se propone y calcula un índice integral de la inversión de capital de inversión (activos) de las corporaciones internacionales en el sistema económico del país según el alto y bajo nivel de desarrollo de la industria turística.

El artículo concluye que es necesario crear un entorno favorable para la inversión que estimule el crecimiento de los flujos turísticos y el desarrollo de infraestructura. El volumen de inversión extranjera directa en la industria del turismo demostró que estas inversiones se equilibran mediante un sistema de regulación contracíclica, lo cual es acorde a los requisitos del sistema económico mundial.

Palabras clave: corporaciones internacionales, industria turística internacional, riesgos de inversión, capacidad de inversión, sistema económico global.

INTRODUCTION

The current stage of world economic development marked by the liberalization of the economy and the expansion of international economic ties, has led to an increase in the scale of internalization. This has resulted in increased interdependence and interconnectedness of national economies. The phenomenon of internalization has caused significant transformations in the world economy, affecting investment in the tourism industry, activating investment processes, and putting forward new quantitative and qualitative requirements for the development of countries with a weakened economic system in the international tourism business.

The international tourism industry has emerged as a significant contributor to the macroeconomic growth of most countries worldwide. It has also emerged as an effective channel for fostering cross-cultural understanding and collaboration, particularly between states, nations, and even civilizations. It plays a pivotal role in fostering mutual understanding and collaboration, as well as in resolving religious and social conflicts that have emerged in contemporary society.

Concurrently, the process of internalizing of the investment environment in the international tourism industry is dynamic and in alignment with the development models of international corporations, standardizing the quality criteria for service provision and influencing the pricing of the tourist product in the regulatory mechanisms of individual countries. It is important to note that the network universalization of the assortment of the services on an international scale is typified by the criteria of partnership relations in the tourism business (Farsari, 2012). Consequently, the international tourism industry is witnessing a profound shift in the investment environment, characterized by a shift towards a more diverse and complex investment landscape. This diversification is evident at all levels of universalization, encompassing a wide range of economic sectors and serving as a foundation for the pursuit of security and sustainable development.

The priority of our research is to develop an adaptive and institutional approach to determining the format of internalization of the investment environment in the international tourism industry for the reproduction of the service sector, which, through the prism of the investment paradigm, combines a standardized (global) approach to the expansion of the tourist segment (in accordance with the requirements for the unification of the quality of the tourist product) with a non-standardized an approach to investing investment capital of international corporations in separate economic systems of countries, in terms of their territorial features. This will facilitate the optimization of investment processes, the expansion of tourist facilities in international destinations, the distribution of investment resources between countries, and the provision of quality tourist services in accordance with the requirements of the global economic system.

This article examines the investment environment internalization in the international tourism industry with the objective of elucidating the key aspects of this process, identifying the factors influencing its effectiveness, and developing recommendations for improving the tourism market investment attractiveness. This article aims to provide a comprehensive analysis of the investment environment internalization in the field of international tourism. The aim is to enhance understanding of the key aspects of this environment and to determine their impact on the development of the tourism sector. Finally, recommendations for further improvement of this environment will be developed.

LITERATURE REVIEW

The peculiarity of the internalization paradigm of investing in the international tourism industry is a distinctive phenomenon. Production (increasing the share of investment capital of international corporations to expand the segment of the tourism industry, building up foreign assets of the tourism market in countries with a weakened economic system, international standardization and unification of the service sector); distribution (anticipatory increase of investment resources of the tourism sector in the gross domestic product (GDP) of countries, distribution of the accumulated capital of in-vestment funds for the reproduction of the tourism industry in countries with a weakened economic system, employment growth in tourism companies). The exchange of resources between international joint investment institutions and the tourism sector is a key aspect of this strategy. This involves the internalization of value in the tourism sector, changes in partnership relations and the exchange of investment resources to expand the network of international travel agencies and produce their investment capacity in countries with a weakened economic system. The consumption of investment

resources, which is the internalization of consumption, has a positive effect on investors (international corporations) who accumulate resources and carry out specialized investment activities. These activities are typically conducted through transactions with securities, which ensure the networkization of services. Furthermore, the growth of the share of consumption of tourism products in the national income of countries has a positive effect on the tourism industry (Hill, 2013).

At all stages of the internalization of investment capital in the international tourism industry, the process of legal, economic and organizational conditions for sustainable development of the country takes place. All types of funds from the state budget that are transferred abroad or received from abroad by the decision of governments and capital that is managed by interstate intergovernmental organizations are official investment capital that is exported for the purpose of obtaining profit or expanding economic influence on international institutions of joint investment (Trusova et al., 2022). Stable partnership relations regarding investment in the production and implementation of services at the international level, with established rules, norms and self-regulation, allow for the identification of their architecture.

This is the result of the systemic interaction of universal investment institutions (institutes of demand and supply for investment capital, capital pricing, competition, ownership and internalization of investment income from the development of the tourism industry) and specific institutions of a non-market nature (visa, migration status, transport logistics, information ecosystems of the tourism industry and the provision of services in time and space, among other factors) (Tsviliy et al., 2023). The set of international institutions of joint investment is a form of internalization that ensures the proportions of the global distribution of resources in the trend of subject-species, territorial-geographic and regulatory diversification. This predominant use in the tourist market is informed by the principles of people-centeredness, humanism, tolerance, respect for freedoms and human rights, democracy, and mutual trust.

The absence of international corporations from the set of institutions engaged in joint investment represents a significant geographical diversification of direct foreign investment in the tourism industry. The isolation allows the formation of investment assets belonging to branched investment structures of the transnational type, with the objective of maximizing net investment income and generating excess profits on an international scale (Trusova et al., 2023). At the same time, the internalization of investment income from investing in the tourism industry is the concentration of product production in the service sector in the legal, innovation-investment, spatial-territorial,

socio-economic dimensions through the formation of international corporations that create a new competitive environment in the international economic system and implement a set of measures of a strategic nature for a country with a weakened economic system in the post-conflict (post-war) period.

The term "international corporation" is defined as a corporation that includes structural units in two or more countries, regardless of legal form and field of activity. Additionally, within the framework of the decision-making system, it carries out a coordinated policy and implements a general strategy through one or more command centers. Furthermore, it links individual units through ownership or in any other way, when one or more of these units can have a significant influence on the activities of others and, in particular, share knowledge, resources and responsibility with them (Yakubovskyi et al., 2006).

Accordingly, the organizational and economic concept of internalization of the in-vestment environment in the international tourism industry is unique and requires substantiation of the hypothesis regarding the expediency of the formation of a high-quality segment of tourist services by an international corporation in countries with a weakened economic system on the basis of an adaptive and institutional approach to investing in structural network companies of the tourism market. This approach includes both the forms and types of real (financial) investments for evaluating the quality criteria of the provision of tourist services (material infrastructure, reliability of services, knowledge of customer needs, etc.), and the criteria for evaluating the quality of tourism business entities (tourist transport, tourist accommodation facilities, maintenance of tourist flows, etc.) (Yevdochenko, 2010).

Although there is a paucity of scientific works dedicated to the subject of the contemporary evolution of the investment environment in the international tourism industry, a select few of these works address specific areas that warrant in-depth analysis. Stability and transparency of laws are crucial for studying the investment environment internalization in the international tourism industry since countries with clear, stable, and transparent investment rules and legislation are the most attractive for investors in the tourism industry. Levchenko et al. (2021) and Krupskyi et al. (2019) discuss the issues of legal regulation in the field of tourism in their works. The authors emphasize that it is necessary to harmonize legal rules at the international level in the field of international tourism.

The works by Polishchuk et al. (2019) and Chang (2018) provide insights into the economic component of the investment environment internalization. A review of the research conducted by leading scientists indicates that investments in the tourism industry yield a

high rate of return and contribute to the rapid turnover of capital, thereby attracting investors. Furthermore, investors assess a country's resilience to economic crises and risks, such as natural disasters or political turbulence.

In their respective works, Britchenko et al. (2019) and Sarvarian (2023) seek to unify the theoretical approaches to internationalization in the international tourism industry. They also undertake a review of theories and concepts related to the internationalization of business and investment in the tourism sector. In their respective works, scientists have observed that countries that actively promote their tourism products, engage in marketing campaigns, and participate in international tourism exhibitions are more attractive to investors.

Wang et al. (2024) emphasize the crucial role of government management in shaping the investment environment in the tourism industry. Tang and Yu (2023), on the other hand, focus on the importance of government support as a necessary factor. Governments can actively work to create favorable conditions for tourism investment, providing financial support, tax incentives, and infrastructure development.

The World Economic Forum also published a rating of tourism competitiveness in European countries, where Switzerland took the highest position, followed by Germany, France, Austria, and Sweden. Ukraine did not receive significant advantages and found itself in lower positions next to Serbia, Moldova, and other countries.

Thus, the analyzed works confirm that the investment environment internalization in the international tourism industry involves creating favorable conditions for attracting capital and developing the tourism sector. This, in turn, contributes to the economic growth and social development of the country. The investment environment includes a set of fundamental financial, political, and socio-legal rules and organizations that determine the form of the social structure. The studies by the above scholars show that the issues of the adaptational-institutional approach to determining the format of the investment environment internalization in the international tourism industry remain insufficiently addressed. Given the above, there is a need to distinguish globalization trends in the development of international tourism in this article, which makes our research relevant and valued.

METHODS

International corporations, as investors planning to make portfolio investments in the tourism industry of a country with a weakened economic system, must, first of all, determine the form of their structure in the tourism market segment of this country (Fig. 1).

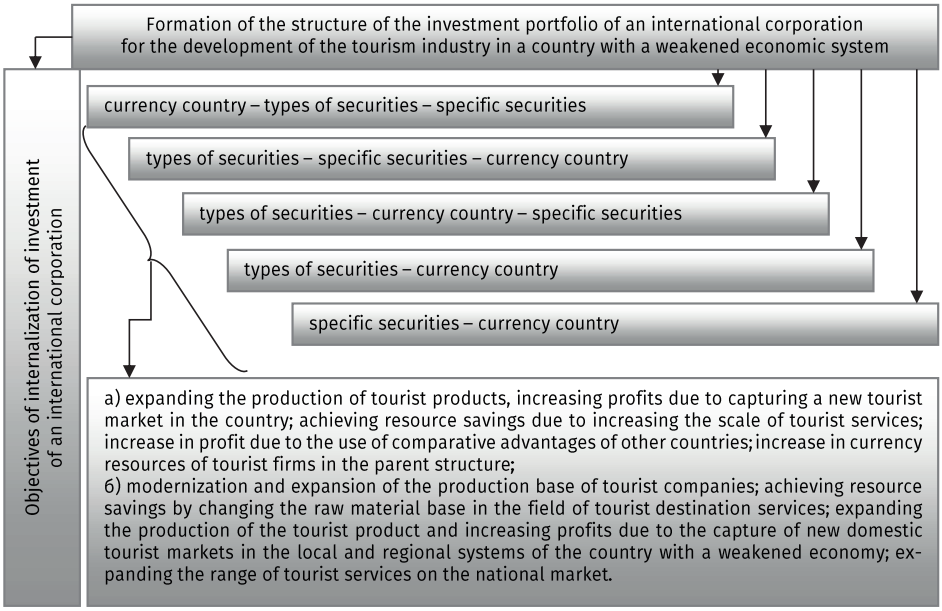

Figure 1. Investment Portfolio Structure for Tourism Development in Economically Weakened Country.

Source: developed by the authors according to Carlisle et al. (2016), Diachenko et al. (2018).

At each stage of the considered sequences of the formation of the structure of the investment portfolio of an international corporation (ICs) for the development of the tourism industry in a country with a weakened economic system, a set of specific securities is distinguished depending on the goals of their use. These goals include obtaining a quality (return and risk) close to the quality of the market portfolio, which is structured to correspond to the capitalization of the tourist market; obtaining a yield higher than the yield of the market portfolio; and hedging risk below market portfolio risk.

Simultaneously with the formation of the structure of the foreign investment portfolio of an international corporation must determine the principles of risk management. In parallel, the following options are available: to refrain from implementing any measures, in the hope that a favorable situation will arise; to diversify investments between countries with a more stable economic system and types of securities, as well as economic sectors and securities; to increase the share of investments in risk-free assets; to choose less risky assets and investment currencies based on the forecast of their quality; to take special measures to protect against

adverse changes in asset prices and (or) exchange rates.

The arbitrage pricing theory of investment capital (assets) posits that the return on capital (asset) is determined by a number of general factors that affect the return on a security (asset). Arbitrage pricing of investment capital is common to all securities (assets), but they affect the level of expected income (price) of securities (assets). The level of expected income is sensitive to each of the factors. That is, this sensitivity ("beta") can be higher or lower for a specific security (asset). Accordingly, the level of expected income is sensitive to the interaction of these factors. The expected return on a security (asset) is a linear function of the "beta" coefficients (Rokocha et al., 2001):

$$E(R) = R_0 + \beta_1 RP_1 + \beta_2 RP_2 + \ldots + \beta_k RP_k \quad [1]$$

where, RP_k – the risk premium associated with the factor k; R_0 – risk free rate.

Factors affecting income from securities (assets) diversify the investment portfolio of international corporation for the development of the tourism industry in a country with a weakened economic system. This is due to the regulatory control mechanism of the parent structure of the international corporation. These factors are detailed into: real economic factors (economic growth of the tourism industry in the country, production of tourist product and use of the capacities of the country's industrial sector to serve the field of tourist services); monetary factors (changes in the interest rate on credit investment of tourism industry entities or changes in the level of inflation affecting consumer demand in the field of tourism services, etc.); internal factors (variable share of factors reflecting macroeconomic deviations of the crane with a weakened system of development of the tourism industry, which is dependent on the investment policy of countries with a powerful system of international cooperation and partnership, etc.); industrial factors (a set of factors common to all industries operating and serving the tourism industry in the country) (Rokocha et al., 2001).

The investment portfolio diversification model singles out such a feature of an international corporation as an investor who is concerned not only about the yield (profitability) of their investments, but also about reducing investment risk. The corporation prefers low profit but risk-free investments in the tourism industry. Suppose that an international corporation-investor has the opportunity to invest its capital W both in itself (in the country where the legal status of the parent structure is registered) and abroad (in a country with a weakened economic system). The optimal value of the structure of the investment portfolio (α) is determined by formula (2) (Rudenko-Sudarieva & Krysyuk, 2015):

$$\frac{H_1-F_1}{H_2-F_2}=\frac{(1-q)U'\{[\alpha-1]F_2\}W}{qU\{[\alpha H_1+(1-\alpha)F_1]W\}} \quad [2]$$

where, α – optimal structure of the investment portfolio.

For an international corporation acting as an investor, a reduction in the level of risk $U(C)$ occurs with an increase in the consumption of assets of a country with a weakened economic system; in other words, the greater the proportion of income spent on homogeneous goods and services, the lower the marginal utility of investments. That is, for an international corporation, the obtained scale of income from risky investments will have the same utility as from income with a smaller amount but using more reliable investment assets. If the marginal utility remains unchanged with a gradual increase in the income consumed for the expansion of the tourism business, then the level of investment risk will not be important for such an international corporation, since the selected investment portfolio will provide the same expected return as in the country where the legal status of the parent structure is registered, as well as in a country with a weakened economic system. If is $U(C)$ the same for all C, then equality (3) will have the form (Solnik, 1983):

$$\frac{H_1-F_1}{H_2-F_2}=\frac{1-q}{q}, \quad [3]$$

This hypothesis is interpreted as follows:

$$\begin{aligned} q(H_1-F_1) &= H_2-F_2-qH_2+qF_2,\\ qH_1-qF_1 &= H_2-F_2-qH_2+qF_2,\\ qH_1-H_2+qH_2 &= qF_1-F_2+qF_2,\\ qH_1+(q-1)H_2 &= qF_1+(q-1)F_2, \end{aligned} \quad [4]$$

Accordingly, it is confirmed that the expected profitability of international corporations in both external and internal investment environments is equal. This indicates the corporation's intentions to expand its influence on the institutions of the international tourism industry. And it also indicates its intention to enter the tourist market of countries with a weakened economic system in order to expand production capacities and increase consumer demand for services. This equality is the foundation of the hypothesis that international corporations will internalize their investments in the tourism industry. In order to increase the profitability of their investments in the domestic and foreign tourism markets, international corporations will fulfill the balance of their investments in the tourism industry and accumulated capital, abstracting from the analysis of risks and liquidity of assets included in their investment portfolios. For the sake of argument, let us assume that $H_1 \geq F_1$, and $H_2 \leq F_2$. In this case, we will analyze the portfolio formation process graphically (Fig. 2).

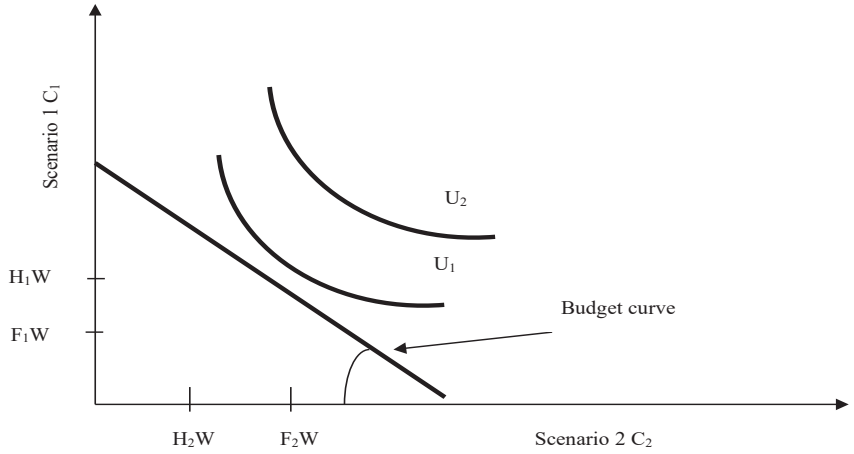

Figure 2. The Process of Forming an Investment Portfolio of an IC for the Development of the Tourism Industry of a Country with a Weakened Economic System

Source: developed by the authors according to Solnik (1983); Rokocha et al. (2001); Rudenko-Sudarieva & Krysyuk (2015).

The utility function $qU(C_1) + (1-q)$ $U(C_2)$ represents segments of tourist services that an international corporation-investor can purchase with its income from investing funds under the first and second scenarios of the development of the tourism industry in a country with a weakened economy. Each indifference curve represents a portfolio that allows the international corporate-investor to obtain the same expected utility. The movement along the indifference curve is accompanied by a decrease in income and consumption under one scenario of accumulation of investment resources and their investment in the tourism industry of a country with a weakened economic system and their simultaneous growth under the second scenario. For example, reduction ($C2$) should be compensated by overgrowth (C_1) vice versa. All curves have a downward shape, that is $U'(C)$ decreases with increasing (C). In other words, a reduction (C_1) requires a greater increase in consumption ($C2$), to maintain a similar level of utility.

According to equations (2)-(3), the choice of the structure of the investment portfolio of an international corporation, denoted by the coefficient (α), is formed by consumer demand in countries with a developed macro-regional and local-regional tourism system and its expansion into countries with a weakened economy, taking into account the particularities of their cultural heritage and natural destinations. Such differentiation of the choice of the investment portfolio of an international

corporation allows to invest resources with a minimal risk of capital loss in each of the possible scenarios of the development of events in the tourism industry. That is, choosing the optimal investment portfolio is choosing the best combination of (C_1) and ($C2$). The line of budget constraints (the curve of the market efficient frontier) allows the international corporation-investor to make a choice between the expected income under the first and second scenarios. Accordingly, the coefficient (α) can be determined from equation (3) (Rudenko-Sudarieva & Krysyuk, 2015):

$$\alpha = \frac{F_2W - C_2}{F_2W - H_2W} \qquad [5]$$

Substituting this expression into equation (2) are get the following equation (6) (Rokocha et al., 2001):

$$\underbrace{C_1 + \frac{(H_1 - F_1)}{(F_2 - H_2)}}_{\phi} \times C_2 = W \underbrace{\frac{(H_1F_2 - H_2F_1)}{(F_2 - H_2)}}_{Q},$$

$$\phi \geq 0,\ Q \geq 0, \textit{since as}\ H_1 \geq F_1,\ H_2 \leq F_2, \qquad [6]$$

where, ϕ –the opportunity cost of an investment portfolio invested in the development of the tourism industry of a country with a weakened economic system, that is, obtained according to scenario 2, which is determined according to scenario 1, in the currency of the donor country of investment assets– plays the role of the relative price (angle of inclination);

Q – the level of income of the consumer of tourist services (the maximum possible level of consumption of tourist products when implementing the investment portfolio of an international corporation according to scenario 1).

Thus, an international investor corporation transferring investment assets to a country with a weakened economic system deliberately determines possible losses ($\boldsymbol{H_1}$ - $\boldsymbol{F_1}$), in order to obtain potential income ($\boldsymbol{F_2}$ - $\boldsymbol{H_2}$). According to the first scenario, investments in the country where the parent structure of the tourism company has legal status are more profitable than in a country with a weakened economic system (unregulated economic reforms, budget restrictions due to high investment risk). However, according to the second scenario, the opposite is true (Solnik, 1983). ϕ=the opportunity cost of the investment portfolio according to the scenario (C_1):

$$C = \frac{H_1 - F_1}{F_2 - H_2} = j, \qquad [7]$$

where, j – the absolute value of the slope of the curve (line) of the budget limit for placing the investment portfolio of an international corporation (Fig. 3).

The international corporation-investor achieves the maximization of expected utility at point 1, where the budget constraint line intersects with the highest possible indifference curve (I_1I_1).The

optimal structure of the investment portfolio calculated according to formula (5) shows that the movement of investment flows along the line of the budget limit of the investment portfolio (share of assets of the international corporation-investor) will decrease, because according to scenario 2, the profitability of accumulated assets in a country with a weakened economic system will be higher than in the country where the parent structure of the tourism corporation has legal status.

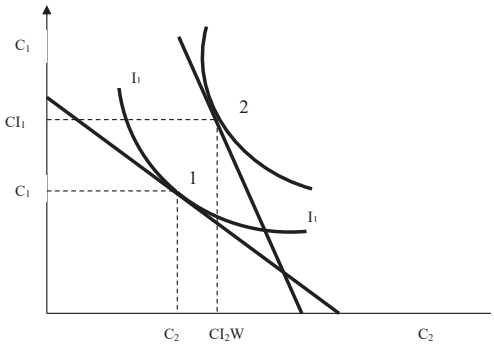

Figure 3. The Optimal Investment Portfolio of an IC for the Development of the Tourism Industry in a Country with a Weakened Economic System.

Source: developed by the authors according to Solnik (1983), Rokocha et al. (2001), Rudenko-Sudarieva & Krysyuk (2015).

Figure 4 shows the cases of a non-diversified investment portfolio for the development of the tourism industry in a country with a weakened economic system.

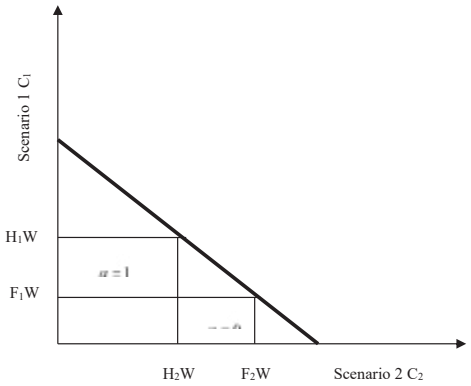

Figure 4. Non-diversified Investment Portfolio of an International Corporation for the Development of the Tourism Industry in a Country with a Weakened Economic System.

Source: developed by the authors according to Solnik (1983), Rokocha et al. (2001), Rudenko-Sudarieva & Krysyuk (2015).

If $\alpha = 1$ – the investment portfolio is formed only from the assets of the parent structure of the international corporation. If $\alpha = 0$ – the investment portfolio is formed only from the assets of international partners. If $\alpha \geq 1$– the international corporation-investor has an insignificant position on external assets and their investment in the tourism industry of a country with a weakened economic system (sells them, investing the received funds in the assets of the parent structure of the tourism corporation). If ($\alpha \leq 0$) – a high position of assets parent structure of a tourist corporation in the tourism industry.

Thus, the graphic and mathematical toolkit allows choosing the optimal investment portfolio of an interna-

tional corporation for the development of the tourism industry in a country with a weakened economic system, taking into account its own preferences regarding resource consumption and savings of invested capital, investment risk and income.

RESULTS

Modern trends of internalization of the investment environment in the international tourism industry are exacerbated by factors of globalization, the aggravation of the scarcity of natural recreation resources and, as a result, intensification of competition for access to these resources. More than a third of international trade in the services market is accounted for by the structural units of international corporations. They control 70-90% of the markets for goods, services, and technologies. The total income of corporations is more than 30% of world GDP (UNWTO, 2022). International corporations are not limited in their activities by international agreements and conventions. This puts them in more favorable conditions on the world tourist market.

In the structure of international investment flows, the form of economic relations has changed, i.e., there has been a transition from the form of exchange of factors for the production of tourist products to the form of exchange of services for the restoration of objects of tourist destinations with the help of foreign investments. Investments in the tourism industry are a tool to restore and increase the pace of economic growth of international corporations (Gerashchenko, 2014). However, over the past ten years, the movement of investment capital (assets) of international corporations in the tourism industry has a natural wave-like character, which is caused by an uneven cycle of development of macro-regional and local-regional systems in most countries of the world (Fig. 5).

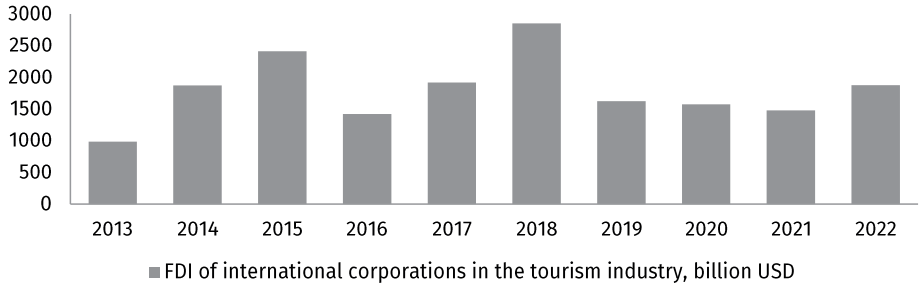

Figure 5. Flows of the FDI of International Corporations in the Tourism Industry for 2013-2022, Billion USD.

Source: built by the authors based on UNWTO (2022), European Commission (2021), Bloom Consulting (2021), Data.Worldbank (2020a).

For 2013-2022, the amount of investment capital (assets) of international corporations in the tourism industry reached its peak value in 2018 and was equal to 2851 billion USD. This indicator exceeded the value of the peak volume in 2015 by 18.2%. In comparison with the level of 2017, the flow of investment capital (assets) increased by 48.4%. However, in 2019-2022, as a result of the decline in income from the tourism industry in foreign branches of international corporations (due to the COVID-19 pandemic and military conflicts in certain countries), especially in countries with a weakened economic systems, reinvested income accounted for only 30% of the total inflow of foreign direct investment.

In 2019, FDI from international corporations in the tourism industry decreased to 1,625 billion USD, which was 57% of the level of 2018. This downward trend was also maintained in 2020-2021 – the level of FDI from international corporations decreased to $1,573 billion in 2020 (1.8 times lower than the 2018 level) and to $1477 billion in 2021 (1.9 times lower than the 2018 level).

For 2018-2021, 1/3 of all cross-border mergers and acquisitions of tourism destinations in the macro-regional and local-regional systems of the countries of the world were related to the resale of foreign firms to other firms. Despite the revival of the flow of FDI from international corporations to the tourism industry in the first half of 2022, this trend was unstable, due to the increase in global political instability, military conflicts in several countries. Despite the lack of a clear understanding of the trends in the further development of the service sector, in 2022 the volume of FDI flows of international corporations in the field of tourism services amounted to USD 1,878 billion, which was 65.8% of the level of FDI flows in 2018 and 65% of the level flows of FDI in 2015.

The increase in the flow of investment capital (assets) from international corporations to the tourism industry allowed to expand recreational and entertainment facilities in the resorts of countries with a weakened economic system, excluding countries with a high risk of investment losses (conduct of terrorist acts and aggressive military conflicts). In 2022, the gross product of 500 thousand foreign branches of international corporations amounted to 3167 billion USD and grew by 2.0 times compared to 2013.

In spite of the instability of the political situation on a global scale, in 2022 the share of investment from international corporations in the countries of the II group and in the countries of the III group increased sharply and amounted to 43% of the global volume of incoming FDI (Fig. 6).

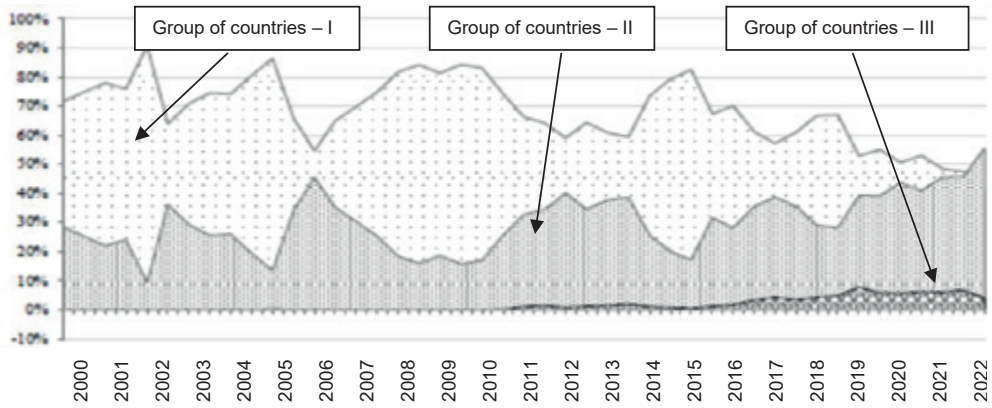

Figure 6. The Structure of Incoming FDI from International Corporations for the Development of the Tourism Industry by Country Groups for 2000-2022 (%).

Source: built by the authors based on data UNWTO (2022), European Commission (2021), Bloom Consulting (2021), Data.Worldbank (2020b).

This was due to a simultaneous reduction in 2021 by 29% of the inflow of FDI in group I cranes (high level of development of the tourism industry), but their share does not fall below the level of 70% of the global volume of FDI for the development of the service sector. Since 2019, the share of FDI development for the development of the tourism industry in the countries of the II group has been constantly increasing. So, in 2019, it was about 28%, in 2020 it was 39%, in 2021 it exceeded the 40% barrier and amounted to 44%, and in 2022 it was 55%. The annual volume of incoming FDI from international corporations for the development of the tourism industry in the countries of the III group is on average 75 million USD, which is equal to 0.04% of the global volume of incoming FDI. During 2000-2018, these countries gradually increased the volume of FDI development from international corporations to 0.7%. In 2022, this share was already more than 5% of the global volume of incoming FDI.

Analyzing the tendency of the development of FDI from international corporations for the expansion of tourist services in individual countries, it should be noted that the structure of the distribution of incoming FDI has changed radically in 2000-2022. From the beginning of 2000 to the beginning of 2010, more than 80% of the FDI flow came from international corporations in the structure of the global volume of incoming FDI among 20 countries where the tourism industry is highly competitive. The main recipients of FDI in the tourism industry are Luxembourg (the volume of FDI development was 12.7%), Great Britain (12.5%), USA

(9.6%), France (5.5%), the Netherlands (3.6%), Spain (2.6%), Germany (2.5%). The structure of outgoing FDI from international corporations that are donors to the development of countries of the II and III groups, by the amount of investment of resources for the activation of investment policy and the expansion of the sphere of services of the tourism industry for 2020-2022 is presented in Figure 7.

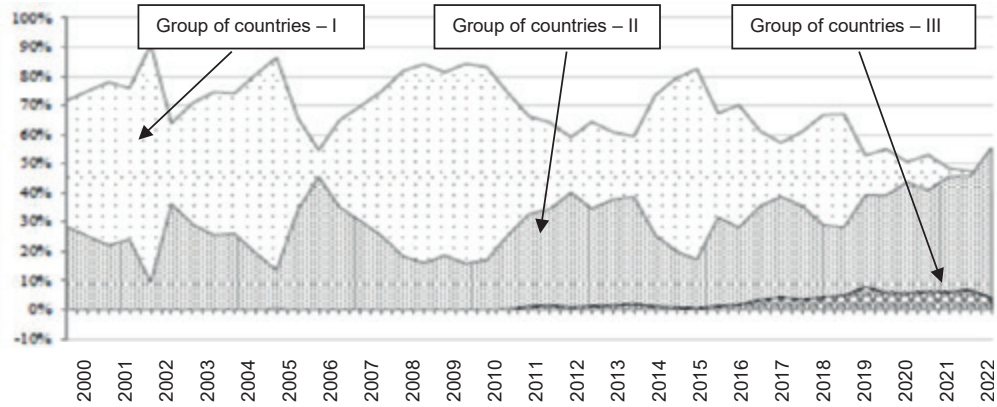

Figure 7. The Structure of Outgoing FDI from International Corporations for the Development of the Tourism Industry by Country Groups for 2000-2022 (%).

Source: built by the authors based on data UNWTO (2022), European Commission (2021), Bloom Consulting (2021), Data.Worldbank (2020c).

The main flows of FDI move from countries of the I group, where the parent structures of international corporations are located. Their share is about 90% of the total volume of outgoing FDI, of which 70-85% of investment capital is directed to intra-corporate internalization; about 15-30% of the investment capital comes from the countries of the II group, which is approximately 13.1 billion USD. Over the past 6 years (2017-2022), the volume of outward FDI from international corporations to countries of the II group increased by 4.6 years and reached the level of 60.5 billion USD. It should be noted that over the past 23 years, the countries of the II group have increased their share in outgoing FDI for foreign corporate internalization from 12.7% in 2000. to 34.6% in 2022. However, in 2022, this group of countries did not have sufficient investment resources that would allow forming a neutral net balance of inflow and outflow of FDI and activating the full scale of services in the tourism industry.

The largest volume of FDI inflows into the service industry comes from international corporations based in OECD countries (Fig. 8). From the

G20 countries (where international corporations are legally registered), half of the incoming FDI from the global development of the tourism economy is attracted to the services sector.

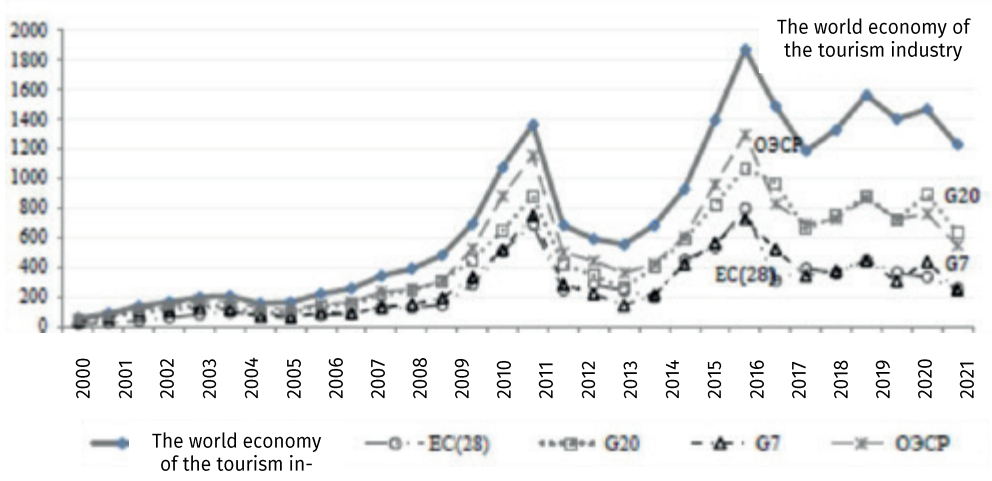

Figure 8. Inward FDI in Terms of Organizations and Associations of International Corporations for the Development of the Service Sector for 2000-2022, Billion USD.

Source: built by the authors based on UNWTO (2022), European Commission (2021), Bloom Consulting (2021), Data.Worldbank (2020d). .

A significant volume of inbound FDI from countries to the tourism industry service sector was recorded for the period 2000-2011 and in 2017. The share of FDI development in this area was about 45-55%. In 2011 and 2017, this indicator reached 75.5% of the total volume of inward FDI from OECD countries, which amounted to 812 billion USD. For the period 2018-2022, the share of incoming FDI from these countries decreased to 64%.

The balancing of FDI flows of international corporations and their investment in the international tourism industry is implemented on the basis of a system of countercyclical regulation, taking into account the existing requirements of the global economic system (Fig. 9).

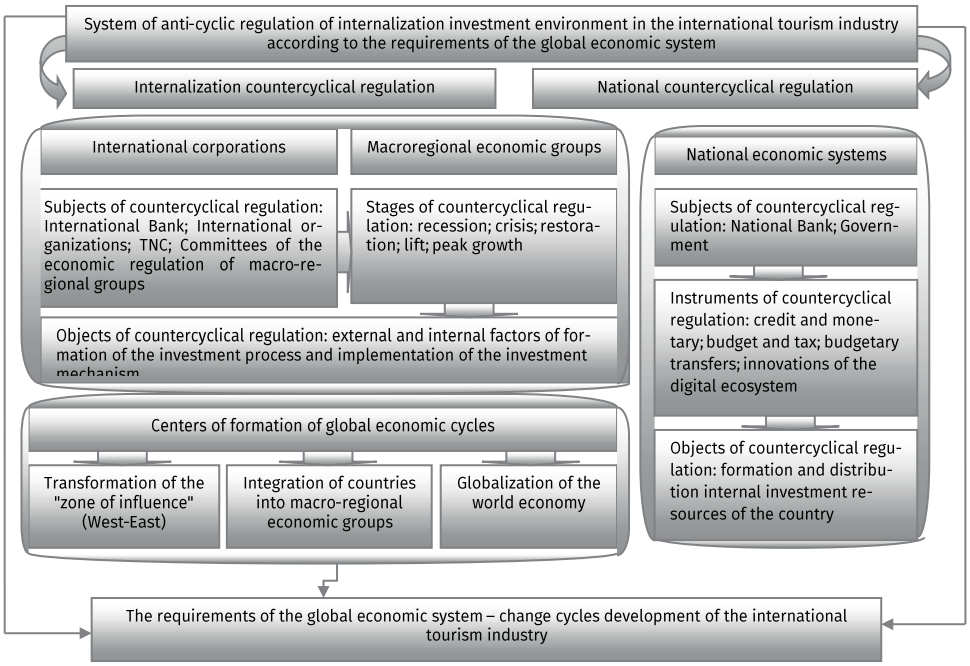

Figure 9. The System of Countercyclical Regulation of the Internalization of the Investment Environment in the International Tourism Industry.

Source: built by the authors based on Chernichenko & Mityushkina (2016), Hill (2013).

The main elements of the system of countercyclical regulation of the internalization of the investment environment in the international tourism industry are two subsystems: countercyclical regulation at the macro-regional level and anticyclical regulation at the level of the national economy. The main tasks of the system are: detection and containment of asymmetries in international economic development; identification and elimination of the main distribution channels of cyclical processes within the global economy; stimulating the creation of a technological margin of safety against the emerging asymmetry in the development of the global economy; stimulation of the development of the system of competitive advantages at the level of individual regions and branches of the tourism industry, which will allow to smooth out their cyclical declines and recessions by means of an innovative base of budget financing prepared in advance at the macro-regional level; creation of a global investment fund to stabilize and support macro-regional systems during the crisis and stimulate consumer demand for tourism products in the process of exiting the bottom state.

The system of national regulation of cyclical processes should be aimed both at the detection and regulation of threats "brought from outside" and at the detection and regulation of these threats that are formed within the national economy. Necessary elements of the anticyclical regulation system are measures aimed at forming a reserve of technological and financial strength of the international tourism industry, as well as the investment capacity of tourism destination development projects at the macro-regional level. These reserves ensure the smoothing of economic downturns in the tourism industry and are the basis for exiting the recession of countries with a weakened economic system. The reserve of technological strength is formed by stimulating the renewal of objects of tourist destinations with a rich natural landscape.

In order to ensure the maximum efficiency of labor productivity (indicators of the efficiency of the use of labor and time resources) and the return of the objects of tourist destinations with a rich natural landscape on the invested capital. The tool for creating technological strength is the investment of investment capital in the renewal of economic sectors and the expansion of their potential to serve territories with recreation and leisure facilities. Stimulation of the internalization of the investment environment in the international tourism industry should be carried out using a full set of tools: administrative, economic, institutional and information technologies, taking into account the digital ecosystem.

The authors posit that the assessment of the balanced movement of incoming and outgoing flows of FDI from international corporations to countries with different levels of development of the tourism industry should be carried out on the basis of an integral index of the investment of investment capital (assets) in their economic system, which is formed from a system of indicators. The basis of the integral index should include three components: investment resources; investment capacity; investment risks. Each component of the integral index must include a set of sub-indices (factors) and their characteristics.

The method of calculating the integral index of investment capital (assets) of international corporations in the economic system of the i-th country at the j-th level of development of the tourism industry is based on a hierarchical comparison of indicators aggregated in relative scores according to the total score of the integral index and is calculated according to the formula (8) (Voitko & Shatkovskyi, 2013):

$$I_{ic(as)}^{es} = \sum \frac{\sum I_i^{es} + \sum I_{ic}^{es} + \sum I_{ir}^{es}}{N_i}, \qquad [8]$$

where, $I_{ic(as)}^{es}$ – integral index of investment capital (assets) of international corporations in the economic system of

the i-th country at the j-th level of development of the tourism industry;

$\sum I_i^{es}$ – index of investment resources in the economic system of the i-th country according to the j-th level of development of the tourism industry;

$\sum I_{ic}^{es}$ – index of investment capacity in the economic system of the i-th country according to the j-th level of development of the tourism industry;

$\sum I_{ir}^{es}$ – index of investment risks in the economic system of the i-th country according to the j-th level of development of the tourism industry;

N_i – the number of investigated indices.

To aggregate statistical data from 1 to 10, the normalization method is used, which allows observing the rule of the sequence of distribution of the received points (Voitko & Shatkovskyi, 2013):

$$9 \times \frac{x_i - x_{min}}{xmin_{max}+1} \qquad [9]$$

where, x_i – indicator in the economic system of the i-th country according to the j-th level of development of the tourism industry;

x_{min} – the minimum value in the sample of indicators of the economic system of the i-th country according to the j-th level of development of the tourism industry;

x_{max} – the maximum value in the sample of indicators of the economic system of the i-th country according to the j-th level of development of the tourism industry.

For indicators characterizing the maximum value result and for indicators with the worst result, the standard formula for normalization of statistical data is used (Voitko & Shatkovskyi, 2013):

$$(-9) \times \frac{x_i - x_{min}}{xmin_{max}+1} \qquad [10]$$

Therefore, the transformational processes of internalization of the investment environment, according to the requirements of the global economic system, which alter the development cycles of the international tourism industry, have been reduced to the integral level of investment of investment capital (assets) of international corporations in the economic system of individual countries, at each stage of anti-cyclical regulation. 4 economic cycles were selected for evaluation: 2008, 2013, 2018, 2022, which makes it possible to determine the key changes in the development of the international tourism industry among the countries of the world.

The aggregate index of investment resources is calculated based on the ranking of countries by the following sub-indexes (factors): sub-index of financial resources; subindex of

innovative resources of the digital ecosystem; subindex of provision of tourist recreation facilities with additional investment capital; subindex of the development of economically active human resources.

In 2022, the following countries were included in the top five according to the sub-index of financial resources: USA, China, Luxembourg, Switzerland and Japan. The ten countries with favorable conditions in the field of taxation (according to the factor of the sub-index of financial resources – "Tax burden, % of commercial profit") include the following countries: Qatar – 11%, Kuwait – 13%, Bahrain - 14%, Saudi Arabia – 15%, United Arab Emirates – 15%, Brunei – 16%, Georgia – 16%, Singapore – 18%, Croatia – 18%, Armenia – 20%, Luxembourg – 20%.

The top five, according to the sub-index of innovative resources of the digital ecosystem, included the following countries: China – 554.27 billion USD, Germany – 185.56 billion USD, the United States – 154.35 billion USD, Singapore – 130.99 billion USD, Korea – 126.54 billion USD, France – 104.34 billion USD, Japan – 91.51 billion USD, Great Britain – 69.42 billion USD and the Netherlands – 59.13 billion USD.

According to the sub-index of provision of tourist recreation facilities with additional investment capital (% of GDP), the following countries were noted: Ireland – 29% of GDP, Korea, Thailand – 28% of GDP, Czech Republic, Slovakia – 23% of GDP, Indonesia – 22% of GDP, Germany, China, USA – 21% of GDP. About 70% or more of investment capital (% of GDP) is formed in the service sector of tourist and recreational areas of the following countries: Luxembourg - 78% of GDP, Cyprus – 76% of GDP, Greece – 73% of GDP, Great Britain, France – 72% of GDP, Singapore, Switzerland – 71% of GDP, Netherlands – 70% of GDP, Spain – 69% of GDP, Portugal, Italy, USA, Belgium – 68% of GDP.

According to the sub-index of investment risks of economic systems, countries with favorable business conditions are determined: New Zealand, Denmark, Singapore, Korea, Great Britain, USA, Norway, Sweden, Estonia, Finland, Australia, Germany, Ireland, Latvia, Austria, Iceland, Canada, Lithuania, Malaysia and Georgia. Countries with the worst conditions for doing business include Pakistan, Benin, Niger, Ethiopia, Gabon, Algeria, Sudan, Iraq, Cameroon, Nigeria, Guinea, Congo, Bangladesh, Angola, Afghanistan, Chad.

According to the index of investment capacity, the 20 countries with the highest indicator include the following countries: Singapore, Switzerland, Thailand, Mauritius, China, the Czech Republic, Denmark, Hungary, Germany, Bahrain, Jordan, Croatia,

Finland, Lithuania, Malaysia, Georgia, Poland, USA, Guatemala, Luxembourg.

Thus, based on the results of the calculation of the integral index, 20 countries have been determined that have a high level of development of the tourism industry when investing investment capital (assets) of international corporations. (Fig. 10).

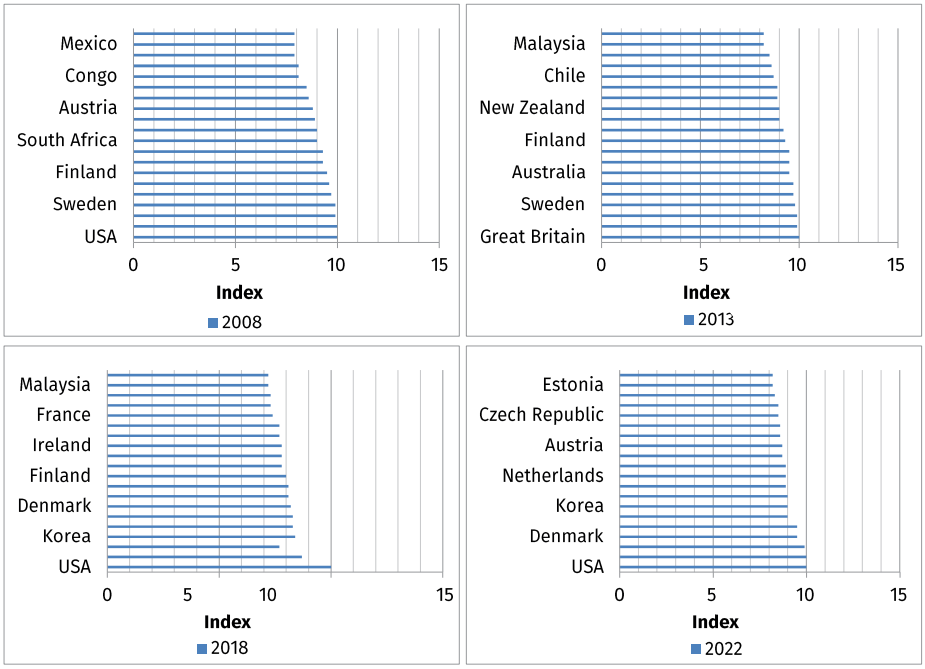

Figure 10. Integral Index of Investment Capital (Assets) of International Corporations in the Economic System of Countries – High Level of Development of the Tourism Industry in 2008, 2013, 2018, 2022

Source: built by the authors based on UNWTO (2022), European Commission (2021), Bloom Consulting (2021), Data.Worldbank (2020a).

The countries with the lowest index of investment capital (assets) of international corporations for the development of the tourism industry are presented in Figure 11. Most of the countries of this group are located on the African continent. However, it should be noted that Asian countries, which in 2008 were in the group of countries with the lowest index of investing investment capital (assets) of international corporations in the development of the tourism industry (Vietnam, Cambodia), crossed the line and moved to the group of countries with an average level development of the service sector. The low index of the investment of investment capital of international corporations in the

tourism industry of the countries of the African continent is due to the small size of the economy, a large tax burden, a low level of human capital development, a low level of savings and attracted FDI.

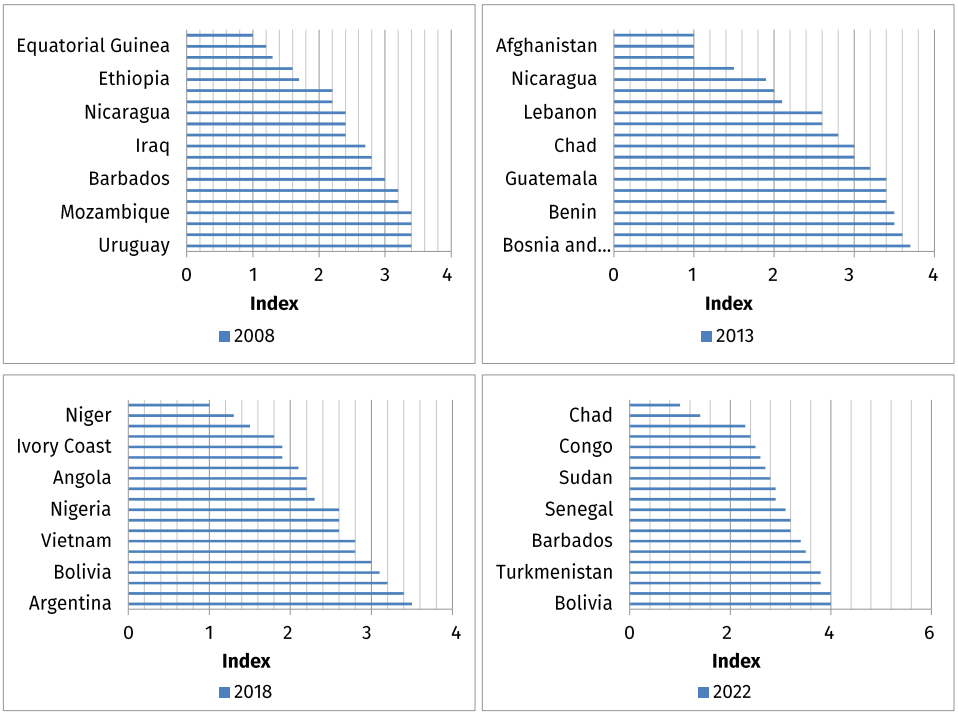

Figure 11. Integral Index of Investment Capital (Assets) of International Corporations in the Economic System of Countries – Low Level of Development of the Tourism Industry in 2008, 2013, 2018, 2022

Source: built by the authors based on UNWTO (2022), European Commission (2021), Bloom Consulting (2021), Data.Worldbank (2020b).

DISCUSSION

The international tourism industry presents a unique opportunity for countries to leverage their investment resources to enhance the capacity of tourist destinations to develop a comprehensive range of services and expand their market share. This, in turn, enables them to participate more effectively in the interstate division of labor. However, the process of internationalization at the level of transnational international corporations (ICs) introduces a qualitatively new dimension to the competitive landscape, intensifying the struggle for market dominance. The potential for international corporations to increase their investment activity in countries with a weakened economic

system and to reduce investment risks in the international economic space is contingent upon the practical implementation of the neoliberal model of internalization (Shvetsova, 2016). The model demonstrates objective international investment processes combined with the policy of anti-cyclical regulation of the tourism industry. This not only enhances the manifestation of specific investment relationships in the market of tourist services, but also smooth's out fluctuations in economic dynamics and reduces the degree of volatility of securities (assets) in the market (Gerashchenko, 2014).

However, the development of the tourism industry in a single country in the model of internalization of investment through international corporations is not identical to the development of global society. The basic structure in world economic life remains the nation-state. Geld (2005) emphasizes that, despite the fact that the modern state is increasingly included in international economic relations, its role as a nation-state has not been exhausted due to the blurring of global regulatory mechanisms.

It should be noted that international corporations do not absorb national tourist destinations, since the main trend of the modern development of the tourism industry in terms of internalization is the formation of diverse geo-economic structures united by socio-economic interests and strategic investment guidelines. The internalization of the investment environment in the international tourism industry is the result of the principle of diversity, since parent structures of a global type encourage the intensification of investment activity, which is associated with the transition of national economies to the adaptation-institutional level, which implements mechanisms for the maximum use of investment advantages of national economies in the system of international labor distribution in the tourist market.

In fact, the formation of these structures is a necessary condition for integration opportunities for the development of the international tourism industry on a socio-economic basis. The fundamental novelty of the development of the internalization of investment in the international tourism industry is the gradual acquisition of a holistic character (Honcharenko & Skliarenko, 2017).

At the same time, the current stage of internalization of investment in the international tourism industry is characterized by the following features (Ferraro & Briody, 2017): complication of international investment processes; expanding the possible variation of macro-regional and local-regional systems in the tourism industry by reducing the asymmetry of the service sector; the periodic occurrence of phenomena of a resonant nature within the framework of the internalization of the geo-economic space, with the

strengthening of the unstable development of society; intensive growth of periods of radical change in information technologies, the emergence of a global digital ecosystem.

In fact, at the current stage, the non-linear nature of the internalization of investment in the international tourism industry is observed, the phenomenon of which is a complex system of attractors (Gourinchas & Rey, 2014): an information-technological system that is generated by a digital ecosystem in a limited communication space, providing on its platform an intensive information exchange with methods and means of protection of international investment of capital, between national structures of different socio-economic levels; an international socialization system, which is generated by an adaptive and institutional approach to the development of human-centered systems in the tourism business, focused on revealing the potential of a specific individual.

That is, it can be argued that the shift in the internalization of investment in the international tourism industry allows to expand the export of foreign direct investment to the production of goods and services, to transform the tourism business into a world-scale industry, to implement the international integration of investment capital into the macro-regional and local-regional systems of countries with weakened economies in order to strengthen interdependencies between various branches of the international economy.

According to Chernichenko and Mityushkina (2016), there is an "institutional asymmetry" in the modern international space of the tourism industry, which is the driving force behind the internalization of territories to absorb weakened macro-regional and local-regional systems. Based on the multi-level development of the tourism industry, the internalization of territories with a weakened macro-regional and local-regional system represents the upper level of this process, while the basic level is determined by anthropocentric modes of human existence – stereotypes of life, traditions, cultural values and heritage, consumer demand for entertainment and recreation, etc., which is especially important for the service market.

The sources of internalization of the investment environment of the international tourism industry are (Khondker, 2004):

- using the advantages of owning the natural resources of tourist destinations (or access to them), capital and knowledge;
- the possibility of optimal placement of structural divisions in different countries, taking into account the size of the domestic tourism market, rates of economic growth, qualifications of the workforce, prices for tourist services and the availability

of other economic resources, the development of tourism infrastructure, as well as political and legal factors, the most important of which is political stability (the described complex is especially important for international corporations in the field of tourism);

- the possibility of accumulating investment capital within international corporations, taking into account the movement of resources to the countries where their foreign branches are located;
- using the opportunities of the international economy for one's own purposes (loans from commercial and financial institutions of the host state and third countries, not only the countries where the parent structure is based);
- constant awareness of the state of target markets in different countries, which makes it possible to quickly transfer investment capital flows to countries where favorable conditions for obtaining maximum profit are formed, and at the same time to diversify one's activities;
- constant improvement of the organizational structure of international corporations;
- the use of international management for the organization of production and sales of tourist products, maintaining the high reputation of the company.

It should be emphasized that the speed of the process of internalization of investment in the international tourism industry through international corporations depends on intangible variables (spending on marketing research, the number of scientists, novelty and differentiation of products, etc.), which increases the value of human capital, which possesses exclusive knowledge (patents, copyright, management skills, etc.) (Sharma, 2013).

The mobility of intangible assets and the social nature of their certain categories (in particular, those based on knowledge) are the basis of the concept of the multi-production economy, according to which one company with several structural units is more efficient than several independent firms with one production unit each (Shandrivska & Yunko, 2021). The process of internalization of intangible assets occurs precisely at the intra-corporate level through direct foreign investment, which is an effective means of reducing corporate costs and increasing the competitiveness of international corporations.

Thus, the formation of international corporations gives a powerful impetus to the investment vector of development for service entities in the international economic arena, since their investment activities are more predictable and contain fewer elements of risk than in cases of multiple subordination.

CONCLUSION

Having analyzed the impact of internalization on the tourism industry

development, it is possible to conclude upon the necessity to create a favorable investment environment to stimulate further growth of tourist flows and infrastructure development. The article examines the adaptational-institutional approach to determining a format for the investment environment internalization in the international tourism industry. This approach is based on the relationship between the service sector and the investment paradigm, considering a standardized and individualized approach to the development of the tourism segment in accordance with global requirements for the quality of tourism products and the investment of foreign capital by international corporations in various economic systems of countries.

Consequently, the internalization processes exert a profound influence on the operations of the international tourism industry within the context of the investment environment of international corporations. This is evident in the manner in which the industry develops and the nature of its economic dynamics. The strengthening of relations between the countries of the world leads to the fact that the decision to expand the flow of investment capital from international corporations has a huge impact on the development of the entire world economy. On the one hand, the world community is constantly searching for the direction of sustainable development of the service sector, which, based on the scale of consumer demand for tourist products, strives to create a strong economy that would allow it to take a worthy place on the international stage. The interests of the international community in general and individual countries in particular are multifaceted.

It is crucial to determine the key factors influencing the effectiveness of the investment environment internalization, such as the stability of the political and economic situation, the presence of transparent and stable rules of the game, infrastructure development, etc.

However, both for the international economic system and for the macro-regional systems of individual countries, the main task remains to raise the standard of living of the population, increase social standards, duration and quality of life. The use of the investment tools of donor countries to restore relations with internalization institutions allows to change the economic determinant of investment capital of international corporations and direct it to the development of the tourism industry in local and regional systems. In addition, ensuring the activation of the investment capital of international corporations for the development of new recreational areas is due to the introduction of a multi-indicator that accumulates the investment component of individual sectors of the world economy to serve the subjects of tourist activity in those countries where their economic system is weakened, where the internal distribution of own invest-

ments does not allow to increase assets of tourist destinations that have an average level of provision of objects of the nature reserve fund, objects of natural and cultural heritage.

Despite the difficulties of internalizing the investment environment of the international tourism industry in countries where military conflicts arise, agreements on the future of the international community and the establishment of investment in the post-war period are being strengthened. At the same time, there may be a tangible impact of investment risks on the restoration of sources of investment flows, which may have an asymmetry in the accumulation of a special investment fund. Therefore, to expand the investment platform of macro-regional systems in countries with a weakened geo-economic vector of the development of the tourism industry, it is necessary to diversify tourist services and control the targeted use of investments by international corporations. This will facilitate the enhancement of the value derivative of assets from the position of term of its turnover, implementation of the accumulative function of accumulated investment income on invested funds between international corporations in individual macro-regional tourist destinations.

An analysis of the volume of foreign direct investment in the tourism industry showed that these investments are balanced through a system of countercyclical regulation, which considers the requirements of the global economic system. An integral indicator of capital investments of international corporations into the country's economic system is suggested and calculated depending on the level of the tourism industry development.

The directions for further research in the field of investment environment internalization in international tourism involve expanding the scope of research or using new methods of analysis, such as analysis of specific aspects of the investment environment internalization or comparative studies between different regions or countries. This article may be useful for government agencies and regulators, tourism industry representatives, international organizations and research centers specializing in tourism and economic research, researchers, teachers, and students interested in economics and international tourism.

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DECLARATION OF CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

AUTHORS' CONTRIBUTION

Authors' contributions are equal.

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Increasing EBITDA by Optimizing IT costs for Private Equity Portfolio Companies

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Abstract: The purpose of this study is to examine how private equity firms can increase the EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization) of their portfolio companies through IT cost reduction strategies. A collective case study approach was used along with quantitative data collection schemes. The collective case study provided the advantage of making comparisons across various companies through replication. The quantitative research design allowed for the collection of quantitative data focusing on the performance of the three firms, namely Vista Equity Partners, the Blackstone Group Inc. and CVC Capital Partners. Five key measures were applied, i.e., margin expansion, capital expenditure (CAPEX), capital efficiency, working capital efficiency and mean adjusted change. The IT cost reduction strategies serve as value creation schemes that accentuate the EBITDA in the divestment context of private equity firms. The strategies reduce and eliminate waste, with a primary focus on optimizing being IT costs.

Keywords: cost reduction strategies, financial performance, profit margin enhancement, corporate finance, IT cost control.

JEL classification: F38, D24, M15, E22, O16.

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Aumento del EBITDA mediante la optimización de los costes informáticos

Resumen: El propósito del estudio es examinar cómo las empresas de capital riesgo pueden aumentar los beneficios antes de intereses, impuestos, depreciaciones y amortizaciones (EBITDA) de sus empresas de cartera mediante estrategias de reducción de costes informáticos. Se utilizó un enfoque de estudio de caso colectivo junto con esquemas cuantitativos para la recopilación de datos. El estudio de caso colectivo ofrece la ventaja de poder realizar comparaciones entre varias empresas a través de la replicación. El diseño cuantitativo de la investigación permitió recopilar datos cuantitativos centrados en los resultados de las tres empresas: Vista Equity Partners, Blackstone Group Inc. y CVC Capital Partners. Se aplicaron cinco medidas clave: expansión de márgenes, gasto de capital (CAPEX), eficiencia del capital, eficiencia del capital circulante y cambio medio ajustado. Las estrategias de reducción de costes de TI sirven como esquemas de creación de valor que acentúan el EBITDA en el contexto de desinversión de las empresas de capital riesgo. Las estrategias reducen y eliminan el despilfarro, centrándose principalmente en la optimización de los costes informáticos.

Palabras clave: estrategias de reducción de costes, rendimiento financiero, mejora del margen de beneficios, finanzas corporativas, control de costes de TI.

Clasificación JEL: F38, D24, M15, E22, O16.

INTRODUCTION

Private equity firms are constantly seeking strategies to optimize the value of their portfolio companies. One effective approach is to increase earnings before interest, taxes, depreciation, and amortization (EBITDA). It is often used as a measure of a company's value. Recently, information technology (IT) has become a major factor in creating business value. Consequently, strategies to reduce IT costs have emerged as a way for private equity firms to create value (Diaz Restrepo et al., 2023).

The adoption of technology in private equity has accelerated in recent years as firms have recognized the transformative impact that various systems, hardware, and software can have on private markets. Previously, private equity (PE) firms were viewed as conservative organizations which relied on the quality of their relationships and expertise of their deal as well as operating teams to create value and drive returns (Belderbos et al., 2019; Cohn et al., 2022).

As previously stated by Duchessi et al. (2012), the adoption of technology has been identified as a significant contributor to the value creation process for private equity firms. This value can be observed in a number of contexts, including downstream, midstream, and upstream. In the downstream context, technology enables general practitioners to directly add value to their portfolio companies. In the midstream context, technology allows PE firms to monitor their portfolio entities for more efficient operations (Xu et al., 2017).

What is not known in the PE environment is that IT cost reduction strategies can serve as value-creation schemes that increase earnings before interest, taxes, depreciation, and amortization (EBITDA) in the divestment context of PE firms. In essence, IT cost reduction is the process of identifying and eliminating waste and underutilization. The overarching objective of IT cost reduction is to enhance the value of the business within the IT budget (Duchessi et al., 2012; Lubbers et al., 2015; Meyer, 2014). Also referred to as IT cost optimization, the strategies are substantial

in yielding savings that reduce the IT budget size with the amounts being reinvested into other areas that drive business growth. The strategies facilitate further improvement of EBITDA by providing PE firm managers with guidance on which investments should be prioritized based on the run, grow and transform metrics (Leslie & Oyer, 2008; Moszoro, 2014).

The lack of knowledge regarding IT cost reduction as a technology-driven value creation scheme represents a significant obstacle to the improvement of operational efficiency and the enhancement of EBITDA levels within PE firms. This is attributed to the fact that IT cost reduction schemes are key in reducing padding and allowing PE firms to closely track spending, thereby initiating prompt corrective actions to mitigate overages (Lao, 2022; Singh, 2008; Bajulaiye, 2020). The insight doled out in this report will permit PE firms to spot variances in major areas of IT spending while identifying specific line items and owners in the cost center that are driving variation. Codicil to this, bridging this gap will accentuate knowledge of the various schemes that can be used to monitor Capital Expenditure (CAPEX) and operating expenses (OPEX) variance in a bid to maintain flexibility in the face of austerity.

This issue is also given considerable attention in scientific doctrine. For example, Haque (2023) focused on the study of foreign economic activity, which involves the export or import of capital in the form of both direct and portfolio investments. In the conclusion, he noted that the EBITDA indicator reveals the net profit of the firm, which is accordingly reflected before the payment of interest on loans, but he did not disclose the impact of this indicator on taxation and depreciation, which are part of the financial position of the company. Petersone et al. (2022) studied the experience of various companies that faced a systemic crisis and, accordingly, a significant reduction in both revenues and losses. In their opinion, in such conditions, it is possible to increase the EBITDA indicators by increasing the efficiency of the company's cost management. At the same time, they did not define the essence of this process, nor did they reveal the specifics of its optimization.

Krysta and Kanbach (2022) concluded that the optimization of new information technologies will permit companies to more effectively manage international production chains, including at a distance. At the same time, they did not disclose the expediency of expanding opportunities for companies to obtain cross-border loans in portfolio investments. Korteweg (2022) believes that the information productivity of firms depends on the quality of monitoring of direct and indirect costs of information technologies, but the researcher did not determine how the available resources of the enterprise can be optimized for

its effective development, particularly investment resources. In their research, Wilson et al. (2022) proposed a model of the optimal portfolio of projects, which involved the use of a neurofuzzy approach. At the same time, they did not disclose the impact of the developed model on the optimization of business processes of the outsourcing company.

Xu et al. (2017) examined traditional cost control methods and their limitations, proposing a digital-era approach for cost control and value creation. It highlights how digital infrastructure like cloud computing and the internet reduces information acquisition costs but increases resource search costs. The study suggests employing Extenics, a method for resolving contradictory problems, combined with intelligent management, as a means of addressing these challenges. The proposed intelligent cost control system integrates physical information systems and utilizes real-time resource data and big data for strategy generation.

Su and Tang (2016) examined the impact of different business strategies on economic performance, particularly focusing on innovation and cost-cutting strategies in the Canadian context. Utilizing data from the Survey of Innovation and Business Strategy, the study employs regression models and propensity score matching to analyze the relationship between business strategies and economic outcomes. The authors suggest that firms prioritizing product innovation tend to be more productive compared to those focusing on cost-cutting, although no significant difference is observed in profitability.

This research paper diverges significantly from conventional papers on value creation, presenting quantitative data on the application of cost reduction strategies with the objective of improving EBITDA. Moreover, the research paper will help practitioners make right decisions because it uses case study approaches which highlight the merits and demerits of the cost reduction strategies. By applying first-hand information from renowned companies and managers, practitioners will be able to navigate the arduous nature of value creation and capitalize on modernized schemes.

The objective of the study is to investigate the methods by which private equity firms can enhance the earnings before interest, taxes, depreciation, and amortization (EBITDA) of their portfolio companies through strategies aimed at reducing IT costs.

MATERIALS AND METHODS

The study used a collective case study approach that involved simultaneous and sequential analysis of multiple cases to create a broader understanding of IT cost reduction strategies used by private equity firms to increase EBITDA and improve exit valuations. Furthermore, this approach was essen-

tial for elucidating the manner in which EBITDA affects divestiture valuation within the context of private equity (PE) environments.

A quantitative study design that included large sample sizes was also chosen to aid in the collection of statistical data. The accuracy of the obtained results was increased with the help of statistical data. Their use during the research made it impossible to show personal comments or bias the results, since the data obtained were mostly numerical and fair in all cases (Figure 1)

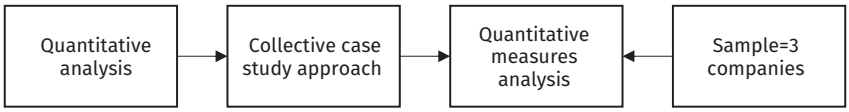

Figure 1. Research Trail.

Source: Compiled by the author.

The model formulation process focused on establishing a set of key metrics that correlate with technology-driven value creation, namely "IT spend." Some changes in "IT spending" have been recorded using qualitative methodologies, and therefore the researcher's introduction of a quantitative aspect to the article is key in determining the effects of the three technology value creation strategies. Table 1 presents the measures to be checked.

Table 1. Measures

Measure	Value-Creation Strategy	Impact Estimate
IT Costs	IT Cost-Reduction	Moderate

Source: Compiled by the author.

The study employed a series of quantitative measurements to ascertain the impact of the implementation of value creation technology on the organization's IT expenditure. The initial measurement was concerned with margin improvement, which entailed an examination of the enhancement in the profitability of an organization's income statement. The subsequent measurement employed in the study focused on the growth rate. The formula used to calculate (1):

$$\text{CAPEX} = \text{PP\&E (current)} - \text{PP\&E (prior)} + \text{depreciation} \quad [1]$$

where: PP&E – Property, Plant and Equipment.

The penultimate measurement entailed an analysis of the efficiency of the use of working capital, employing the turnover ratio of working capital. The measurement was crucial for visualizing the value-creating impact of reduced IT spending on the private equity life cycle

as they seek to increase EBITDA and improve valuation for exits. The quantitative case study approach involved a number of steps that were used in the data collection process as illustrated in Figure 2.

Figure 2. Case Study Approach

Source: Compiled by the author.

The first step was to define the case found on the formulated research questions. Next, cases were selected using a collective approach. The companies for analysis were selected on the basis of an analysis of current private companies in the US market and their former US portfolio company holdings (Vista Equity Partners, The Blackstone Group Inc., CVC Capital Partners).

The data collection process involved the analysis of financial information and annual reports provided by companies that considered the case with a fixed time horizon of 10 to 20 years. The final stage of data collection and analysis focused on re-viewing and sorting the data collected from the case studies. Charts were created to display and interpret the information.

So, the study will utilize various quantitative measurements to ascertain the extent of the change in "IT spending" following the implementation of the value creation technology. The initial measurement will concentrate on margin enhancement, which assesses the growth in profitability of an organization's income statement. The subsequent measurement employed in the study will specifically target the rate of growth. The second-to-last measurement will entail analyzing the effectiveness of working capital utilization through the turnover ratio of working capital. The measurement will be crucial for visualizing the value-generating impact of decreased IT expenditure on the private equity life cycle, as they strive to enhance EBITDA and enhance valuation for exits.

RESULTS

Vista Equity Partners

The case study analysis of Vista Equity Brother reveals that the company employs a strategy of baselining, which assists in the identification of potential avenues for IT cost reduction. The baseline strategy defines the expected values and conditions against which all performances are compared with the baseline serving as the fixed reference point. The baseline further analyses the current performance of the information

technology systems against the anticipated levels for the specific tasks within a pre-established time phase. Instead of this, the anticipated levels for the company were focused on improving the EBITDA margin which has tripled over the past five years. Since the introduction of baseline strategies, the company has recorded EBITDA rates of up to 120 million with the portfolio companies reporting influxes in earnings by 29% and 2.2 on an annual basis (Fintel, 2023). Owing to the impressive performance and growth, the baseline strategy has reduced costs effectively with the company's net worth hitting highs of 86 billion USD in assets under management. As of 2021, the EBITDA margin for the company was set at 22.2%, representing an increase from the 20% reported in the previous year.

In order to effectively manage capital expenditure, the private equity firm has implemented initiatives such as sourcing optimization, which have significantly reduced IT operating expenses. The sourcing optimization initiative entails the implementation of schemes that optimize the utilization of IT resources and circumstances, thereby enabling Vista Equity Partners to achieve its objectives (Vista, 2021) to find the most effective and quality schemes. Through this strategy, Vista Equity Partners has been able to increase savings potential as elucidated in its capital expenditure rates. As of 2021, the firm's capital investments were set in accordance with the calculations:

PP&E (current) = 86,000,000,000 USD; PP&E (prior) = 73,000,000,000 USD; Depreciation = 11.284%, CAPEX = 86,000,000,000 USD – 73,000,000,000 USD + 11.284% = 21,237.320.000 USD.

The combination of the baseline and sourcing optimization strategies has come in handy in reducing IT costs in the firm by offering insight into how much the firm is spending on the systems and how much they are getting in return. The baseline strategy has set a point of reference which allows Vista Equity Partners to check its annual spending on system/infrastructure. The EBITDA for the firm as opined prior is 22.2% while the revenue was 4.5 billion USD with its current operating assets being set at 86,000,000,000 USD. Thus:

ROOA = Net income/Operating Assets,
ROOA = 4,500,000,000 USD / 80,000,000,000 USD = 0.0565 (0.5%).

The ROOA is a clear indication of the fact that Vista Equity Partner has thus far been able to manage its expenses and IT costs through the baseline and sourcing optimization strategies. The latter is quite useful for the company as it helps it determine the risk and return profile. This, therefore, enhances the efficacy of decision-making processes with regard to the generation of value for the firm in both the short and long term. The application of IT cost reduction strategies which are driven by the chief financial officer/chief information officer (CFO/CIO) organization has played a role in improving the EBITDA

levels at the company. The CFO, Lauren Dillard, works in tandem with Brent Lanier to evaluate the technology resources at its disposal and their ability to generate sales and working capital. Thus far, the company has been able to increase its working capital turnover rate to 0.0563 (0.5%) with the data:

Working capital efficiency = sales / working capital, Sales = 4,500,000,000 USD, Working capital = Current assets − current liabilities, Current assets = 80,000,000,000 USD,

Current liabilities = 100,000.000 USD, Working capital = 80,000,000,000 USD − 100,000,000 USD = 79,900,000.000 USD, Working capital efficiency = 4,500,000,000 USD / 79,900,000,000 USD = 0.0563 (5,625%).

The working capital efficiency is similar to the ROAA with the data revealing that the company is operating efficiently. This result is further informed by the fixed asset utilization data which is derived by dividing the sales by the fixed assets to bring the fixed asset utilization (FAU) to 0.0565 (Fintel, 2023). Suffice to say that the operations of Lauren Dillard and Brent Lanier have helped in the reduction of IT costs and improvement of the EBITDA levels in the company. The combination of baseline strategies, sourcing optimization as well as CFO/CIO involvement is attributed to changes in the profitability and revenue creation rates at Vista Equity Partners (Figure 3).

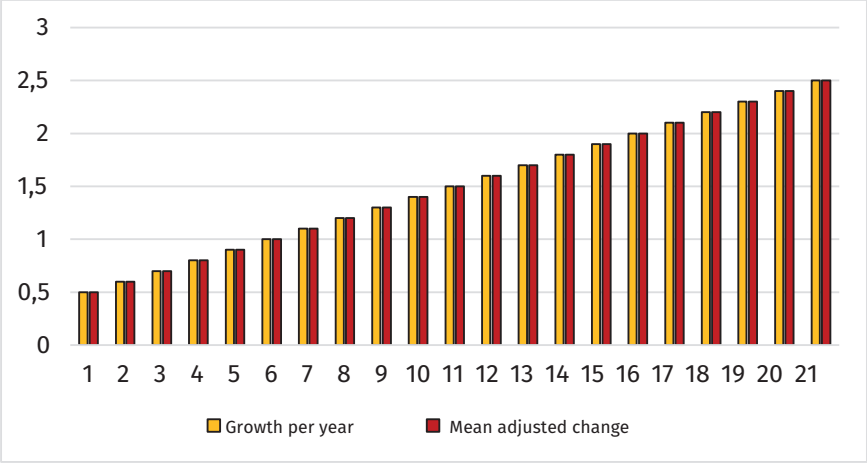

Figure 3. Vista Equity Partners' Mean Adjusted Change

Source: compiled by the author.

The EBITDA results show that the three strategies had an extraordinary effect on the company's performance over the past 5 years with a t-4 mean change being recorded. In fact, the EBITDA margin shows that the PE firm has statistically significant better results when it comes to profits compared to

its peers. The mean changes are commingled with the EBITDA with the operating profitability increasing by a rate of 2.2% annually (Hughes, 2013). In light of this, the PE firm creates value through margin expansion and technology-driven strategies.

The Blackstone Group Inc.

Blackstone Group implements the use of sourcing optimization strategy which helps in streamlining the procurement and approval of investments. Most recently, the company acquired the Coupa management solution which has optimized Blackstone Group's operations with collective spend intelligence being driven across the case company (Blackstone, 2012). Thus far, the company's EBITDA has increased by an annual rate of between 2.5% and 560.14% from 2018 through to 2021 (Blackstone Inc., 2023). As of 2021, the company's EBITDA was set at 12,115,000.000 USD which was a 560.14% increase from the number reported in 2020 at 2.86 billion USD (Blackstone, 2021, 2022, 2023).

The sourcing optimization strategy towards Coupa management solutions have allowed Blackstone to better manage and estimate its capital expenditures. The solution streamlines the amount of money spent by the firm on fixed assets and investments (Blackstone, 2021; Hughes, 2013). Furthermore, it defines the consistent processes in the investment portfolio with the data helping in the identification of opportunities across the company and fund levels at Blackstone Group Inc. Similar to Vista Equity Brother, the case firm has increased its savings potential with the CAPEX rates as of 2021 being set at 102,480,000,000 USD:

PP&E (current) = 126,000,000,000 USD,PP&E (prior) = 30,000,000,000 USD,Depreciation = 21.6%,

CAPEX = 126,000,000,000 – 30,000,000,000 + 21.6%= 102,480,000,000 USD.

At Blackstone Group, the use of sourcing optimization has gone a long way in increasing capital efficiency levels. This is attributed to the fact that the strategy evaluates payment strategies for vendors and the number of investment funds pumped into the fund level. Furthermore, it leverages external resources while ensuring that the company invests strategically. On top of this, sourcing optimization has allowed the firm to make continual improvements to its operations on a daily basis while continuously monitoring performance against its goals and analyzing gaps with the aim of determining their root causes. The sourcing optimization has established a closed-loop procedure that links cash management processes at the fund and company levels. This has inadvertently improved decision-making as well as control with the end outcome being an influx in operational flexibility (Choi et al., 2020).

Statistical data from the company reports reveals that the revenue/net income has increased substantially to 5.208 billion USD as of 2021 which was a 567.97% influx from the amounts recorded in 2020 at 1.045 billion USD (Blackstone, 2021, 2022, 2023). In 2018, the company had a net income of 2.05 billion USD which was a 32.49% increase from the 4.79% reported in 2017. The asset growth rates brought about by the sourcing optimization strategy were set at 39.03 billion which is a 55.89% increase from the 26.269 billion USD recorded in 2019. Between 2017 and 2018, the firm reported an increase in asset growth from 28.925 billion USD to 32.586 billion USD by 12.66%. The ROAA has additionally gone up due to sourcing optimization with the below calculations confirming the assumption:

ROOA = Net income⁄Opersting Assets,Net income = 5,208,000,000 USD,

Operating assets = 26,269,000,000 USD= 5,208,000,000 USD / 26,269,000,000 USD= 0.19 (1.9%).

As shown in the preceding section, the ROAA of the company is set at 0,19 which positively contributes to the working capital efficiency. As the number of ROAA increases, so does the working capital efficiency of Blackstone Group. The sourcing optimization has permitted the firm to reduce its working capital when it comes to the use of technology. The working capital efficiency as of 2021 is estimated at:

Working capital turnover = sales ⁄ working capital, Sales = 5,208,000,000 USD, Working Capital = Current assets − Current liabilities,

The company's fixed asset utilization rate is set at 0,19, which indicates that the sourcing optimization strategy has been effective in improving its working capital efficiency. The working capital shows the extent and solvency levels of the Blackstone Group with the sourcing optimization permitting it to review short and long-term strategies (Kaplan & Strömberg, 2008). The flexible investment policies adopted by Blackstone Group are substantial in driving more capital in current assets which results in the increased opportunity cost of profitability. Furthermore, the company has been able to maintain a larger portion of liabilities in its capital structure with the profitability going up through EBITDA influxes caused by the fixed asset utilization.

The mean adjusted change for the company is estimated at t-4 similar to that of Vista Equity Partners. The EBITDA influxes have gone up by 0.19 on an annual basis which is correlated to the operating profitability as well as working capital efficiency. The sourcing optimization has therefore played a substantial role in helping Blackstone Group reduce costs and increase its operation value.

CVC Capital Partners

CVC Capital Partners employs sourcing optimization and baselining strategies, which permit the company to expand its margins. The two are primary sources of operational performance improvements as the company is able to achieve cost reductions that optimize its operations (Subirana, 2003). On top of this, baselining has rendered the requisite information vital in negotiating cost savings and enhancing the management of investments at the fund level. The end result is an influx in the EBITDA to at least 17.3 million USD as of 2021 compared to the 9.35 million reported in 2020 (margin expansion of 85.03%) as shown in Figure 4.

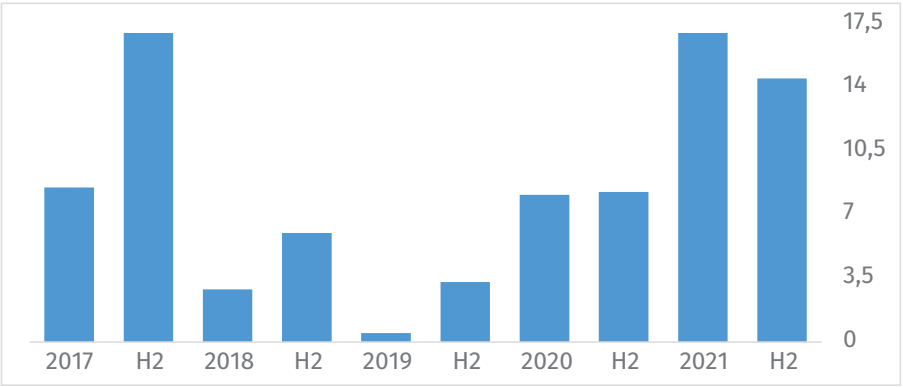

Figure 4. CVC Capital Partners EBITDA after the Introduction of Sourcing Optimization and Baseline Strategies

Source: Compiled by the author based on CVC (2022).

The case study analysis reveals that the sourcing optimization strategy has permitted CVC to develop its investments alongside existing technology alliance strategies. The sourcing optimization provides information on which investor assets can be used to improve profitability and EBITDA levels. Thus far, the CAPEX rates at CVC have gone up to 38,900,000 USD after the introduction of the sourcing optimization strategies:

PP&E (current) = 164,000,000 USD, PP&E (Prior) = 139,000,000 USD, Depreciation = 10%, CAPEX = 164,000,000 USD − 139,000,000 USD + 10% = 38,900,000 USD.

The baseline measures as well as sourcing optimization strategies have been substantial in increasing the net income for the company from 18,707,000 USD in 2020 to 50,686,000 USD in 2021. The operating assets have also gone up from 332,249,000 USD to 362,147,000 USD in the same period. The ROOA for the firm is set at 0.139 which is an indication

that the strategies have allowed CVC to return most of the finances spent on assets and investment portfolios:

ROOA = Net income/Operating Assets, Net income = 50,686,000 USD, Operating Assets = 362,147,000 USD, ROOA = 50,686,000 USD/ 362,147,000 USD = 0.139 (1.3%).

With a ROOA of 0.139, CVC has been able to improve its working capital efficiency with the baseline permitting it to define business and corporate-level strategies. The definition process has allowed it to reduce costs and improve profitability. Currently, the working capital turnover is set at 0.15, which is well within the industry average:

Working capital turnover = sales/working capital, Sales = 50,686,000 USD, Working Capital = Current assets − Current liabilities, Current assets = 362,147,000 USD, Current liabilities = 38,090,000 USD,Working Capital = 362,147,000 USD − 38,090,000 USD = 324,057,000 USD, Working Capital Efficiency = 50,686,000 USD / 324,05,000 USD = 0.15 (1.5%).

Given that the working capital efficiency is low at 0.15, it can be reasonably assumed that the mean adjusted change is at t-3. This is due to the fact that the case firm has invested a moderate amount of its financial resources and profits into the fund level. Moreover, the performance rates are considerably lower than those of its industry peers. Nevertheless, the implementation of baseline and source optimization strategies has enhanced operational efficiency and overall EBITDA. Table 2 further demonstrates that sourcing optimization, when employed in isolation, is likely to result in an increase in the margin, capital efficiency, CAPEX, and working capital efficiency. This strategy ensures that information technology resources are utilized in an efficient manner, with quality schemes being implemented to minimize waste.

Table 2. Quantitative Peer Comparison Data

	Peer Comparison		
	Vista Equity Partner	**The Blackstone Group**	**CVC Capital Partners**
Strategies	Baseline/Sourcing optimization/ CFO and CIO involvement	Sourcing optimization strategy	Sourcing Optimization/ Baseline strategies
Margin Expansion	22.2%	560.14%	85.03%
CAPEX	21,237,320,000 USD	102,480,000,000 USD	38.900,000 USD
Capital Efficiency	0.0565	0.19	0.139
Working Capital Efficiency	0.0563	0.647	0.15
Mean Adjusted change	t-4	t-4	t-3

Source: compiled by the author.

Table 2 suggests that the implementation of three key strategies, namely baselining to identify opportunities and levers, sourcing optimization, and CFO/CIO involvement, is essential for the expansion of margins while reducing capital expenditures. This is because the baseline strategy lowers the IT cost base with unnecessary items or processes being eliminated. Furthermore, it simplifies the investment and data collection processes with the company budget being maintained. The cost variances and performance of the IT systems at the firms are estimated using the baseline strategy with recommendations being provided on the way forward.

DISCUSSION

Throughout the investment lifecycle, private equity firms strive to enhance EBITDA (earnings before interest, taxes, depreciation, and amortization) to assess the potential for divestment. Vista Equity Partners, The Blackstone Group, and CVC Capital Partners have successfully improved their EBITDA by implementing IT cost reduction strategies. The primary focus of these strategies is to optimize IT costs. The strategies primarily concentrate on identifying and eliminating inefficiencies while enhancing the financial worth of the private equity (PE) sector at both the fund and company levels. It is crucial to acknowledge that the issue of whether the EBITDA improvement resulting from IT cost reduction can be sustained is still unresolved. Optimizing IT spending and eliminating waste can lead to long-term efficiency improvements. Nevertheless, if the cost reductions are excessively profound, they may merely yield a temporary financial surge, resembling financial manipulation, before adversely affecting operational capacities. The longevity of a company is likely to be determined by the continuation of strategic IT investments, coupled with careful reductions in less significant expenses. Examining the EBITDA trends over an extended period after implementation will provide insight into the long-term viability.

The margin expansion rates are bound to increase if the three strategies are combined. This is because the strategies expand the income statement profitability of the organization. The measure reflects the amount of revenue that remains in relation to the IT costs and other costs that are elucidated in the income statement. It is quite imperative to note that the income statement profitability is defined based on the perspective of the case study managers (Murugan & Ramprathap, 2022). Klonowski (2014) opines that while the shareholders are largely interested in the profit margin, the PE manager considers a comprehensive perspective which is oft focused on the EBITDA margin. The EBITDA reflects the earnings that are generated prior to the remuneration of equity and debt. Moreover, finding a reasonable profitability and

valuation measure is determined by its persistence with regard to longitudinal sustainability as well as its predictability with regards to whether it is able to forecast the future in a smooth manner.

The sourcing optimization systems dole out insight on how much companies are spending on the systems and the returns generated. The IT cost reduction strategy maximizes savings via leveraged power with the firms gaining an ability to standardize processes and best practices. Casalino et al. (2019) opines that there is a need for firms to adopt private marketplace models when introducing sourcing optimization strategies. The marketplace models nix the siloed approach to decision making with the necessary market information being collected (Jonny, 2022). Furthermore, the information permits the management to gauge how it can improve EBITDA by cutting its operating expenses while improving the total revenue.

The inclusion of the CFO/CIO is momentous in determining the direction of the organization. The two leaders use their capabilities in the execution of investment theses that increase EBITDA rates in the divestment context. Furthermore, they provide guidance on operational excellence and the specific support systems that can uphold the strategic decisions made by the top brass. It is imperative to note that the CFO is tasked with linking the portfolio company with the investors while the CIO builds relationships with other leaders. The relationships are substantial in determining which areas require cost-cutting and continuous improvements.

The analysis of the results and discussion shows concerns regarding the impact of IT-cost reduction on the EBITDA. This is because the EBITDA measurement might overstate the true profitability of the company in industries that are asset intensive. The overstatements are brought about by the exclusion of depreciation. Other critics argue that the EBITDA calculation cannot be used as a performance indicator due to the fact that it does not take into account working capital changes. This is an indicator that the liquidity of a firm might fluctuate along with the capital expenditures, taxes, and interest rates. Additionally, the EBITDA excludes interest on debt as well as capital expenditures, thereby failing to provide a comprehensive estimation of a firm's cash flow generation rates.

Although the IT cost reduction strategies in the cases studied showed an increase in EBITDA, overly aggressive cost-cutting comes with certain risks. Haphazard IT budget cuts can hinder critical investments in innovation and modern technology platforms, leading to a decline in a company's competitiveness over time. In addition, severe spending cuts can damage employee morale and retention if they are perceived as draconian, making it difficult to attract and retain the best IT talent.

Rather, a balanced approach will likely be required to ensure that strategic IT investments remain funded along with pragmatic cost optimization.

On the contrary, the enhancement of the EBITDA is cited by researchers as useful in increasing profitability in absolute terms. The EBITDA margin is calculated by adding the operating income (EBIT) to the amortization and depreciation (Harbula, 2015). The data derived from the calculation can be used to compute the EBITDA ratio whereby the EBITDA is divided by the net sales. The EBITDA measurement enables management to evaluate the net income of the firm while determining the debt service coverage ratio. Moreover, the EBITDA margin measurement is pivotal in determining whether the firms in the collective case study are able to standardize their performance against industry averages. The EBITDA formula provides a fair lens of how well the business is performing while calculating the revenue and cash flow. At that time, Brown et al. (2021) found in their research that some firms can manipulate the EBITDA margin. The researchers gave an example of when such firms give up divisions that are less profitable for the company. The results obtained in the study are consistent with this conclusion. This is because in both works it is proven that the mentioned actions of the companies lead to an influx of activities that are not related to real improvements or changes in the activities of the target company. Thus, the general conclusion is that with the help of EBITDA manipulation, companies can falsify the results of their activities and, in particular, to artificially improve them. In addition, it should be emphasized that similar actions of companies are also aimed at the liquidation of divisions that are economically unprofitable for them and negatively reflect on their investment balance.

According to Heinrich (2023), if a firm has a negative EBITDA, there is a high probability that the organization has low cash flow. A similar position was found in this study, namely, it was established that a positive EBITDA is a sign that the company is highly profitable. With the help of comparative analysis, Heinrich conducted a study of various factors that directly affect the company's investment balance. The effectiveness of this process depends on the correct selection of attachments that are the objects of comparison. The general conclusion in the studies is that high employee turnover indicates that the day-to-day operations of the firm are optimized. Based on this, in the case of obtaining low coefficients, it is advisable to assert the deterioration of the enterprise's productivity, as well as to develop measures to increase this indicator.

Effective implementation and sustainable IT cost reduction requires robust organizational change management. Leadership support that signals strategic priority is essential, as well as trans-

parent communication of vision and goals. Building a culture of continuous improvement and cost awareness is vital for sustainable optimization. Proper governance mechanisms must be in place to evaluate IT investments, identify losses, and monitor performance against targets. Employee engagement and incentives related to cost control can further reinforce desired behaviors.

CONCLUSIONS

To summarize, implementing strategies to reduce IT costs can significantly enhance EBITDA rates and levels in the context of PE divestment. The previous report provides quantitative findings on the implementation of IT cost reduction strategies in three companies, demonstrating that all of them lead to an increase in EBITDA levels. Recommendations suggest that combining the strategies of baselining, sourcing optimization and involving the CFO/CIO can greatly enhance value, potentially increasing it by a factor of ten. It is important to mention that while the study findings were consistent in all three cases examined, it may be excessive to generalize them as a universal conclusion for all private equity exit scenarios without additional evidence from a larger sample.

Within the framework of the study, the experience of three companies, namely Vista Equity Brother, The Blackstone Group Inc., CVC Capital Partners, was considered. It is established that the first company systematically uses basic strategies, on the basis of which the factors of IT cost reduction are possible. Vista Equity Brother is actively engaged in the management of capital costs, and therefore independently created a mechanism for optimizing suppliers. The latter, in turn, play an important role in the context of reducing the company's IT operating costs. Thus, the approach consisting of a combination of basic and special supply optimization strategies is effective and allows reducing IT costs in the firm. As for the Blackstone Group's approach, the study found that it is based on a procurement optimization strategy. As a result of its implementation, a closed loop is created, which allows tracking of cash transactions at the firm level. CVC Capital Partners' experience, which is based on the optimization of sources and basic strategies, was also revealed during the research. On the basis of these two approaches, there is an increase in the company's operational efficiency, which contributes to the reduction of IT costs. Consequently, the company is able to utilize its IT resources in a more effective manner in the short term. In the subsequent scientific works, it is recommended that the potential for increasing EBITDA through the application of artificial intelligence be explored.The study provides quantitative evidence that the implementation of IT cost reduction strategies such as baselining, source optimization, and CFO/Director involvement can increase EBITDA for PE firms during

the divestiture phase in all cases examined. However, given the limited sample size, future research could examine the implementation and performance evaluation of these strategies across a broader range of PE portfolios and industries. Furthermore, as cost optimization technologies and techniques continue to evolve, there is a need for further research to develop more sophisticated cost optimization models that incorporate newer techniques such as artificial intelligence, with the potential to further enhance EBITDA.

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DECLARATION OF CONFLICTS OF INTEREST

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Customers' Attitudes and Perceived Constraints to E-Banking Services: A Survey Study in Albania

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Abstract: The relevance of the study is determined by the need to identify the level of satisfaction of customers of banks in Albania and the perceived limitations that hinder the development of electronic services. The purpose of the work is the analysis of clients' perception of electronic banking services, the problems of ensuring client satisfaction and the development of proposals for its improvement. The methodological approach hinges on several key components: studying statistical data concerning banking services, conducting two-way analyses to explore variable interactions, conducting surveys to gather user insights, utilizing graphical methods to visualize the results, and employing generalization techniques to summarize research outcomes. The analysis of the development of the banking system of Albania, which showed a significant expansion of electronic services for customers, a substantial increase in the share of electronic transfers in their total number during 2010-2022. A survey of bank customers showed that the availability and flexibility of e-banking services are the most important attributes of their quality; however, there is an impact of perceived limitations on the increase in the number of e-banking users and the need to improve customer service has been proven. Despite the ease and speed of transactions, lower costs and time savings, customers do not rate e-banking as a high-quality service and demonstrate insufficient knowledge about these services. There is a need to improve communication with clients and to reduce costs or provide basic electronic banking services for free. The results and conclusions have practical significance in the development of financial and credit policy by the Government of Albania in the projection of the use of electronic technologies, for bank managers in the planning and marketing of banking services.

Keywords: Internet services, banking institutions, information and communication technologies, user behaviour, satisfaction with product quality, Albania.

JEL Classification: G21, L86, O33.

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Actitudes de los clientes y limitaciones percibidas en relación con los servicios de banca electrónica: una encuesta en Albania

Resumen: La relevancia del estudio viene determinada por la necesidad de identificar el nivel de satisfacción de los clientes de los bancos en Albania y las limitaciones percibidas que dificultan el desarrollo de los servicios electrónicos. El objetivo del trabajo es el análisis de la percepción que tienen los clientes de los servicios de banca electrónica, los problemas para garantizar la satisfacción de los clientes y la elaboración de propuestas para su mejora. El enfoque metodológico gira en torno a varios componentes clave: el escrutinio de datos estadísticos relativos a los servicios bancarios, la realización de análisis bidireccionales para explorar las interacciones entre variables, la administración de encuestas para recabar la percepción de los usuarios, la utilización de métodos gráficos para visualizar los resultados y el empleo de técnicas de generalización para resumir los resultados de la investigación. El análisis del desarrollo del sistema bancario de Albania, que mostró una expansión significativa de los servicios electrónicos para los clientes, un aumento significativo de la parte de las transferencias electrónicas en su número total durante 2010-2022. Una encuesta entre los clientes de los bancos mostró que la disponibilidad y la flexibilidad de los servicios de banca electrónica son los atributos más importantes de su calidad; sin embargo, hay un impacto de las limitaciones percibidas en el aumento del número de usuarios de banca electrónica y se ha demostrado la necesidad de mejorar el servicio al cliente. A pesar de la facilidad y rapidez de las transacciones, la reducción de costes y el ahorro de tiempo, los clientes no califican la banca electrónica como un servicio de alta calidad y demuestran un conocimiento insuficiente de estos servicios. Se corrobora la necesidad de mejorar la comunicación con los clientes y reducir el coste o realizar transacciones bancarias electrónicas básicas de forma gratuita. Los resultados y conclusiones tienen importancia práctica para el desarrollo de la política financiera y crediticia del Gobierno de Albania en la proyección del uso de las tecnologías electrónicas, para los gestores bancarios en la planificación y comercialización de los servicios bancarios.

Palabras clave: servicios de Internet, entidades bancarias, tecnologías de la información y la comunicación, comportamiento de los usuarios, satisfacción con la calidad del producto, Albania.

INTRODUCTION

The transformation of the world economy in the conditions of the rapid development of digital technologies and communications allows the creation of new products and services that are more convenient and profitable for consumers. In the banking sector, specially in Albania, such transformations consist in the transfer of services familiar to customers to an electronic format, which demonstrates its advantages in saving financial resources, reducing the time for customer service, the availability of transactions at any time convenient for the customer, and more individualized service. However, the effectiveness of the use of electronic banking services will be greater if customer satisfaction and involvement in the use of these services increases. In connection with the recent increase in the relevance of studying the behaviour of bank customers, there is a need to investigate the satisfaction of customers with banking services and their attitude to electronic banking, as well as to identify the foreseeable limitations that inhibit the spread of the use of electronic banking services.

Issues related to the development of banking activity in the period of digitization were studied by Albanian, Dutch, and other scientists. Ismaili and Braimllari (2021) conducted a study on the frequency of electronic banking service usage among Albanian bank account holders. The results revealed that asynchronous transfer modes (ATM) were the most utilized, followed by electronic point of sale (E-POS) and mobile banking, with individuals over 30 years old using electronic banking less frequently than older demographics.

A comprehensive approach to theoretical and empirical studies of bank profitability was considered by Puci et al. (2023). The authors examined the impact of macroeconomic indicators on bank profitability, in particular the impact of gross domestic product growth, inflation, and the real interest rate during 2011-2020. The reasons for the use of Internet banking services by the population of Albania were considered by Habili et al. (2022). In the study, the scientists used primary data obtained during surveys of various bank customers. The collected responses showed that the declein in

customers' willingness to use cash is a key element affecting the growth of the use of electronic banking services.

Anamali et al. (2021) found that customer satisfaction depends mainly on trust and efficiency and identify the relationship between the quality of banking services and customer satisfaction with these services. Other factors only indirectly affect customer satisfaction with banking services but are significant. The authors emphasize that after the two financial crises of 1997 and 2008, Albanian clients expect quality service in the service to feel safe, which is offered specifically for their expectations.

Analysis of the use of banking services by surveying bank customers in the Albanian city of Korcha was conducted by Sulillari and Nasto (2020) in order to find out how much people in a particular city know about electronic banking and use it. The authors found insufficient awareness of the population about electronic banking services because the information they possessed was superficial. At the same time, the analysis of the level of use of banking services by the population revealed some limitations related to the following factors: Income level, employment, etc. The researchers found that e-banking services are still relatively new to the banking industry but have been on the rise recently.

Taking into account the increase in the level of informatization of the world economy, the banking sector must constantly improve and expand the range of its services, applying innovative technologies, particularly with the help of innovative behaviour and an individual approach to clients (Markovych, 2024). A study revealing the question of how perceived organizational innovativeness affects the individual level of a manager and whether it is considered an organizational risk, as well as how the gender of respondents helps or hinders the process, was conducted by Kör et al. (2021) on the example of the banking sector in Turkey. The results showed that strategies of self-leadership are positively related to the individual level of the manager. The authors have made a significant contribution by providing suggestions and advice to managers and employees regarding the development of organizational environments that encourage innovation in the technology-oriented sector, specifically banking. The scientists emphasized that thanks to the effective application of innovations, the work process is improved, paperwork is reduced, labour productivity in the industry is increased, costs are reduced, and economic benefits are increased.

Despite previous studies of this issue, the question of the impact on the development of electronic banking services, the attitude of customers to these services and the existing restrictions that prevent the greater spread of electronic

services in Albania, requires further and more detailed study. The main goal of the scientific work is the analysis of the banking activity in Albania regarding the introduction of electronic banking and various factors influencing the attitude of bank customers towards the transition to conducting banking transactions with the guarantee of Internet technologies, as well as the development of proposals for improving the perceived usefulness and quality of electronic banking.

The article will investigate the veracity of the following hypotheses:

1. Hypothesis 1: The level of education of bank customers affects their attitude towards electronic banking services, availability of information about such services and awareness of the possibility of using them.
2. Hypothesis 2: The perceived usefulness of electronic banking services for the user is related to how he/she imagines and evaluates the level of service quality.

Therefore, the main questions of this research are signs of perceived usefulness of electronic banking services in Albania and related limitations.

MATERIALS AND METHODS

The theoretical foundation of this research is based on the works of Albanian, Dutch, Polish and other scientists from around the globe who have studied the use of electronic banking in various countries. Information on the development of the banking system in Albania, the use of payment instruments by bank clients, and the infrastructure of banks that allows for settlement transactions, was obtained from the official website of the Bank of Albania (2023).

Statistics on the number of commercial banks in Albania for 2010-2022 are taken from the CEIC Data database (CEIC Data, 2022), which collects the most current economic, sectoral, and financial indicators. Internet penetration rate among the population of Albania in 2013, 2020 and 2023 was analysed given data from the web portal DataReportal (Kemp, 2023), which focuses on statistics and development trends, in particular information technologies.

Information on the total number of bank accounts with Internet access in Albania from 2008 to 2020 was obtained from the online platform Statista (Statista Research Department, 2023), which specializes in market and consumer indicators and provides market statistics, consumer, and company information worldwide. The number of online transactions carried out by Albanians in 2022 is taken from the website of the Albanian newspaper Albanian Daily News (Kote, 2023). Information from 240 users of the Internet and owners of banks of big cities in Albania was collected using an online structured survey conducted

in 2021. The sample population refers to able-bodied customers who live mainly in the big cities of Albania and are bank owners.

The methodological approach is base don a combination of statistical information analysis, factor analysis, and survey methods, graphic methods, and generalization. This study employs a statistical analysis approach to examine the level of Internet penetration among the population of Albania, the dynamics of the total number of bank accounts with Internet access during the period 2010-2022, the use of payment instruments by their main types for the same period, and the trend of the development of the banking infrastructure of Albania during the period 2015-2022.

A structured survey was employed to gather data from individuals utilizing banking services, which permitted the assessment of the prevalence of electronic banking products and services among Albanian customers. A structured questionnaire was developed, comprising questions on a four-point scale, grouped by each quality dimension and the dependent variable of customer satisfaction. The data were managed and analyzed using Microsoft Excel.

The method of two-way variance analysis permitted tha determination of the interdependence between the availability of information about electronic banking and the level of education of the population, as well as between the reliability and quality of electronic banking services. The application of this method entails the calculation of standard deviation values based on a survey sample of bank customers, according to the following formula (1):

$$Std.dev = \sqrt{\frac{\sum(x+\bar{x})^2}{n-1}} \qquad [1]$$

where: x is the value of sample, n is the size of sample.

A graphic method was employed to present data on the growth of the total number of bank accounts with Internet access in Albania are displayed in the form of graphs and charts. Additionally, the data on the shares in the use of banking instruments, particularly by individuals and enterprises, and the development of banking infrastructure (number of facilities and terminals) used for operations in Albania during 2015-2022 were presented.

The application of the generalization method enabled the recording of information obtained during the research process regarding the use of electronic banking in Albania, the attitude of bank customers to the introduction of electronic services and the foreseeable existing restrictions that affect the population's desire to use these services. It also facilitated the formulation of conclusions regarding the factors on which

the level of trust in electronic banking depends and the justification of proposals that allow for an increase in the level of trust of clients in electronic banking services. Finally, it determined further approaches to the study of this issue.

RESULTS

Development of the Banking System and Electronic Banking in Albania

In order to maintain its competitiveness in the market of these services, the banking institution must expand the range of its services, adapting to modern trends in the development of technologies in the world. One of the areas successfully used in banking is electronic banking, the essence of which is self-service for clients. Banks should develop electronic banking services with the objective of satisfying customers as much as possible. To achieve this, it is essential to identify the most important attributes of the quality of these services and to consider customer expectations regarding accuracy, security, network speed, and user-friendliness. Primarily, clients' primary demand for electronic banking is the assurance of robust security during operations. This can be regarded as a significant factor in the assessment of the quality of such services (Khodakivska et al., 2022). In addition, when customers decide to use electronic banking, the key element is the ease of use and the ability and skills of a person in information technologies, which increases customer satisfaction (Khlystun, 2023).

Immediately after the transition to a market economy in 1992, the private banking system began to develop in Albania, in which only 2 banks were still operating in 1991: the Bank of Albania and the Agricultural Bank (CEIC Data, 2022). During the transitional period, the number of banks experienced a significant increase, reaching 16 by 2018. As of December 2022, there were 11 institutions that were fully financed by private capital, both foreign and domestic (CEIC Data, 2022).

The majority of products offered by Albanian commercial banks are standard, including deposits, accounts, transfers, and mortgages. Over the course of a lengthy period, deposits constituted the most popular banking service. However, in recent times, the decline in cash transactions has led to a notable increase in the use of other banking products, including loans, debit cards, and overdrafts. The inaugural financial institution to offer electronic products based on information and communication technologies in 2002 was the American Bank of Albania. For a considerable period, numerous other financial institutions attempted to provide electronic services. For instance, Raiffeisen Bank, through its MultiCash offering, provided electronic transfer services exclusively to a select customer base. Following the year 2007, banks

began to offer a wide range of electronic banking services. In 2007, Credins Bank initiated this process, followed by Tirana Bank in 2008, BKT in 2009, and Raiffeisen Bank in 2009 (Bank of Albania, 2023). The increase in the number of Internet providers and the competition among them contributes to the reduction in the prices of digital services (Prymostka & Kysil, 2023; Abdullayev et al., 2024). As in other countries, the implementation of e-government, voting, connecting schools to the Internet and the use of information technologies in public services (e-procurement) are being initiated in Albania. The proportion of the population with access to the Internet is rising at a steady pace. In 2013, 51.8% of the population had Internet access, while by 2020, this figure had risen to 69%. At the beginning of 2023, the proportion of the population with Internet access had reached 80.1% (Kemp, 2023). Nevertheless, Albania continues to be included in the group of countries with low rates of Internet penetration.

The number of bank accounts connected to the Internet has a constant upward trend (Figure 1).

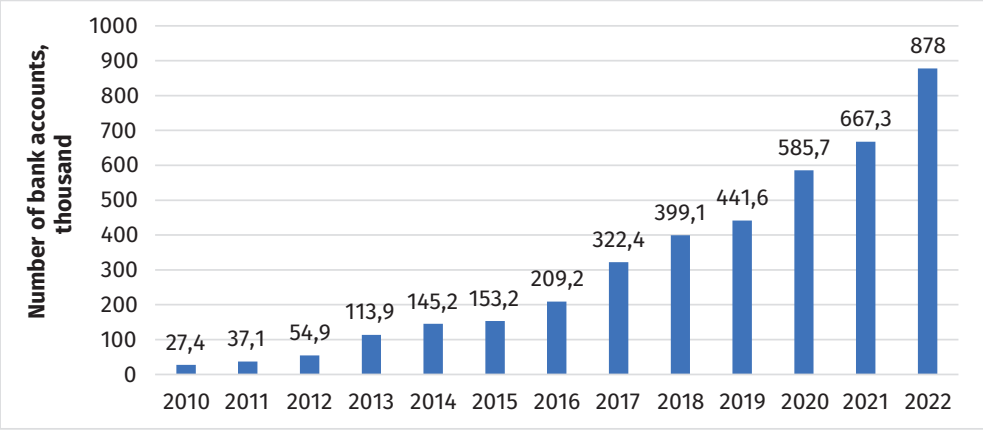

Figure 1. Total Number of Bank Accounts with Internet Access in Albania from 2010 to 2022

Source: compiled by the authors based on Statista Research Department (2021), Kote (2023).

As illustrated in Figure 1, the number of bank accounts with Internet access exhibited an average annual growth rate of 10-30% during the analyzed period. This suggests the rapid integration of Internet technologies into the Albanian banking sector. Popular electronic services provided by Albanian commercial banks include ATMs, Internet banking and electronic cards, which are offered by all banks operating in Albania (Table 1).

Table 1. Electronic Services Provided by Commercial Banks of Albania in 2021

	ATM	Internet Banking	Electronic Cards (Debit, Credit, Prepayment)	POS-Terminals	Mobile/ SMS Banking	Telephone Banking	Payment Acceptance System	
							POS Virtual	PayBox
Raiffeisen Bank	+	+	+	+	+		+	
BKT Bank	+	+	+	+	+	+		
Tirana Bank	+	+	+		+	+		
Alpha Bank	+	+	+	+	+			
Procredit Bank	+	+	+	+				+
First Investment Bank	+	+	+					
Credits Bank	+	+	+	+			+	
Union Bank	+	+	+	+	+			
OTP Bank	+	+	+		+			
Intesa Sanpaolo Bank	+	+	+	+	+			
ABI Bank	+	+	+					

Source: compiled by the authors based on Bank of Albania (2022).

As it can be seen from Table 1, certain electronic services (POS-terminals, mobile and SMS banking, telephone banking, POS online payment system virtual) are provided by only a few banks. It should be noted that in 2021, compared to the previous year, the number of ATMs increased by 11.4%, and the number of POS terminals increased by 13.12%.

Use of Payment Instruments by Banks in Albania

The progress achieved by the electronic finance sector can be analysed by the state of the use of payment instruments (Figure 2).

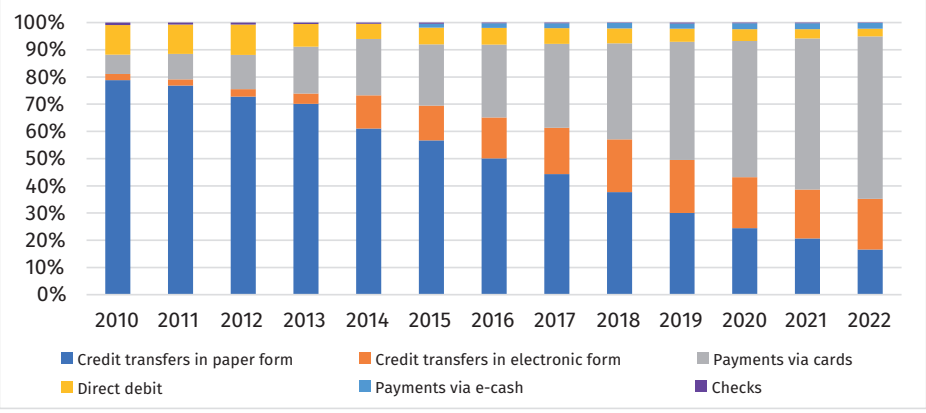

Figure 2. The Dynamics of the Use of Payment Instruments in Albania for 2010-2022

Source: compiled by the authors based on Bank of Albania (2023).

Figure 2 illustrates a clear trend in the use of payment instruments. It demonstrates that the use of electronic credit transfers is consistently on the rise, while the use of paper transfers is on the decline. The use of payment instruments varies depending on the user, wether an individual or a business entity (Figure 3).

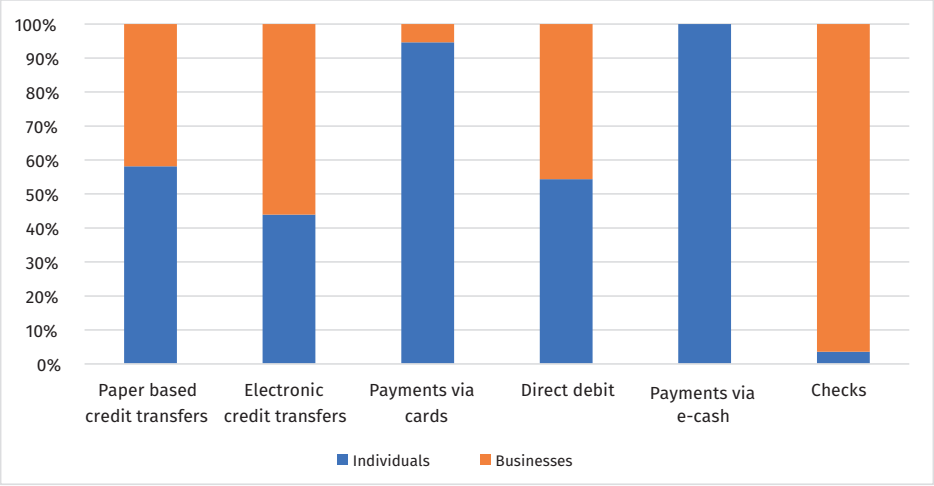

Figure 3. Use of Banking Instruments by Individuals and Enterprises in 2022

Source: compiled by the authors based on Bank of Albania (2023).

Figure 3 shows that in 2022 paper credit transfers were made by approximately 58% of individuals and 42% of businesses, and electronic credit transfers by approximately 43% of individuals, while card payments are used by more than 90% of individuals, whereas electronic cash payments were utilized by only natural persons. The use of electronic money for payments commenced in 2015. From 2015 to 2022, the volume of electronic money payments increased fourfold, from 156,300 to 681,700 transactions.

As reported by the Bank of Albania (2022), the volume of mobile banking payments increased by 29%, while the value of these transactions increased by 22%. The expansion of infrastructure and the dissemination of internet access through the proliferation of smartphone ownership represent the primary driving forces behind the surge in the utilization of mobile banking. As indicated by experts, electronic credit transfers have emerged as the most cost-effective tool in the Albanian economy (Kote, 2023).

The infrastructure utilized by banks for the execution of settlement operations has exhibited a notable expansion (Figure 4).

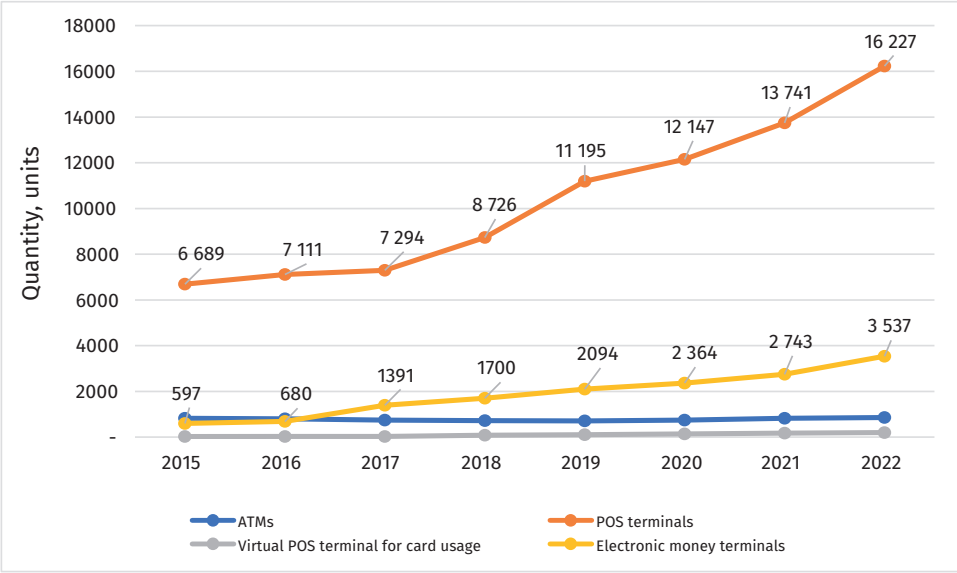

Figure 4. Development of the Banking Infrastructure of Albania during 2015-2022

Source: compiled by the authors based on Bank of Albania (2023).

As can be seen from Figure 4, the number of POS terminals and electronic money terminals has the greatest growth tendency, which during 2015-2022 increased by 2.4 times and 5.9 times, respectively. It should be noted that encouraging the use of electronic money tools has an impact on the financial integration of the population by providing access to banking services to low- and middle-income clients (Mishchenko et al., 2022). Despite the positive trend of increasing the number of POS terminals, the majority of them are concentrated in the city of Tirana (83%) (Kote, 2023). The number of ATMs remained almost unchanged during the analysed period and amounted to 855 units in 2022. In the Albanian market, automated teller machines (ATMs) are primarily utilized for cash withdrawals, rather than for payments.

Compared to other countries of the European region in which Albania is located, this nation has a rather low ratio of cardholders to the total population of both debit and credit cards. Even though the Internet as a business environment has brought practical benefits, it is worth noting certain problems associated with it, for example, information overload, danger to privacy and personal information, etc. For instance, approximately 12% of respondents perceive the electronic banking services offered by Albanian banks to be risky (Kote, 2023).

In addition, the introduction of technological innovations in most cases is not only difficult, but also expensive. Nevertheless, there is a discrepancy between the extent to which electronic banking is utilized and the potential for cost savings and market competitiveness that it offers to banks (Palamarchuk & Korkach, 2023). Statistical data on the economic profitability of electronic banking in Albania is absent, but it is obvious that the cost of one transaction carried out using an electronic channel is much lower compared to a non-electronic form of interaction with the customer.

Survey on Customers' Use of Electronic Banking

The interest in the use of electronic banking services by the population may differ depending on some demographic factors, including age, gender, level of education, average income, and so forth. Additionally, psychographic factors, such as attitudes toward the digitalization of the economy, preferences, and other psychological characteristics, may also influence the use of electronic banking services.

To analyse the attitude of the population of Albania to electronic banking services and their use, a survey was conducted among people of different socio-economic status, which also made it possible to evaluate electronic services from the point of view of professionalism and reliability (Table 2). In the surveyed group, the mean age of the populace stands at 48 years. Within this demographic, 5% hold higher education degrees, while men make up 46% of the respondents. The social status of the respondents is different, as 40% are single, 38% are married, and 22% have another status.

Table 2. Summarized Statistics of Results of Survey of Respondents

Changeable	The Number of Respondents	Value	The Standard Is Not Deviation	Minimum	Maximum	Description of the Variable
Sex	240	0.54	0.50	0	1	Fictitious variable is equal to 1 if the respondent is an Indian, otherwise case — 0
Age	240	47.79	8.76	19	73	Long variable a
Social status	240	1.79	0.76	1	3	Categorical variable, 1 – single, 2 –married, 3 – other
Unmarried	97	1	0	1	1	
Married	92	2	0	2	2	
Other	51	3	0	3	3	
Educational level	240	0.58	0.49	0	1	Fictitious variable: higher education – 1, other – 0
Source of income	240	2.98	0.81	1	4	Categorical variable, 1 – income from entrepreneurship, 2 – entrepreneurship and salary, 3 – salary, 4 – other.

Continuation Table 2

1. Which bank would be the most appropriate to open a bank account with.						
BKT	240	0.60	0.49	0	1	Fictitious variable: is equal to 1 if the respondent has at least one account in the corresponding bank, in another case – 0
Raiffeisen Bank	240	0.31	0.46	0	1	
Credits Bank	240	0.29	0.46	0	1	
Intesa SanPaolo Bank	240	0.10	0.31	0	1	
OPT Bank	240	0.04	0.20	0	1	
Tirana Bank	240	0.02	0.14	0	1	
ABI Bank	240	0.02	0.14	0	1	
Union Bank	240	0.02	0.14	0	1	
Other banks	240	0.04	0.20	0	1	
2. Do you have information about the services of electronic banking?						
Information about electronic banking services	240	0.90	0.31	0	1	Fictitious variable: 1 – the respondent knows about the services of electronic banking, other – 0
3. How did you find out about services of electronic banking? (few answers are possible)						
Banking institutions	240	0.60	0.49	0	1	Fictitious variable: 1 – the respondent receives information about services of electronic banking from of the specified source, other – 0
Social networks and the Internet	240	0.44	0.50	0	1	
Familiar	240	0.23	0.42	0	1	
4. Are you a permanent user of the Internet?						
Usage of Internet	240	1	0	1	1	Fictitious variable: 1 – yes answer, 0 – otherwise
5. Would you like to carry out banking operations online?						
Readiness for electronic banking	240	0.92	0.28	0	1	Fictitious variable: 1 – answer is yes, otherwise – 0
6. Do you use electronic banking?						
Electronic banking user	240	0.71	0.46	0	1	Fictitious variable: 1 – answer is yes, otherwise – 0
7. Which services of electronic banking do you use precisely? (few answers are possible)						
Opening/closing of accounts/deposits	240	0.29	0.46	0	1	Fictitious variable: respondent uses electronic banking for the specified purpose – 1, other – 0
Online payments	240	0.75	0.43	0	1	
Money transfers	240	0.69	0.46	0	1	
8. How is the reliability of services of electronic banking evaluated?						
Reliability	240	1.75	1.15	1	4	Categorical variable, 1 – reliable, 2 – risky, 3 – unreliable, 4 – no information
Reliable	155	1	0	1	1	
Risky	32	2	0	2	2	
Unreliable	14	3	0	3	3	
There is no information	39	4	0	4	4	
9. How is it evaluated quality services of electronic banking?						
Professional	92	1	0	1	1	Categorical variable, 1 – professional, 2 – sufficient, 3 – low
Sufficient	118	2	0	2	2	
Low	30	3	0	3	3	
10. What are the advantages of using electronic banking? (few answers are possible)						
Lightness and speed of management of account	240	0.69	0.46	0	1	Fictitious variable is equal to 1 if the respondent is inclined to this preference, otherwise – 0
Availability	240	0.83	0.37	0	1	
New knowledge and safety _	240	0.42	0.49	0	1	
Increase in price of services at the cash desk	240	0.42	0.49	0	1	
Availability of more information from banks	240	0.31	0.46	0	1	
All the above reasons	240	0.25	0.43	0	1	

Source: compiled by the authors.

As illustrated in Table 2, over 60% of respondents whose primary source of income is a salary report income from business, entrepreneurial activity, and wages. Additionally, 23% of respondents report income from another source, including assistance from relatives or social assistance. At the same time, the type of income is a factor that can affect the usage of products of electronic banking.

According to the data presented in Table 2, the National Commercial Bank of Albania is preferred by 60% of customers, followed by Raiffeisen Bank and Credins Bank with 31% and 29%, respectively. Other banks are preferred by less than 10% of customers.

Also, during the study, it was found that there is an inequality between urban and rural areas of Albania regarding the use of the Internet, and the distribution of Internet users in cities is higher than in rural areas.

The responses of the respondents to the survey, as presented in Table 2, indicate that the majority of individuals (40%) obtained information about electronic banking from a bank institution, while 56% accessed this information via the Internet. Additionally, 77% of respondents indicated that they received this information from relatives, while 19% reported obtaining it from various sources. The research indicates that the primary source of information is not banking institutions, but the Internet and social networks. These channels should be regarded as genuine marketing avenues for the sale of electronic banking products.

Two-Way Analysis of the Relationship Between Influencing Factors on Customer Perception of Electronic Banking

To establish the correspondence between the factors affecting the attitude of customers to electronic banking services, it is advisable to investigate the relationship between awareness of electronic banking and the level of education of the population (Table 3).

Table 3. Two-Way Analysis of the Dependence Between the Availability of Information About Electronic Banking and the Level of Education of the Population

Availability of Information/Level of Education	Higher Education	Secondary Education	Together
The answer is "Yes", persons	133	81	214
Part, %	55.42	33.75	89.17
The answer is "No", persons	5	21	26
Part, %	2.08	8.75	10.83
Together, persons	138	102	240
Part, %	57.5	42.5	100

Source: compiled by the authors based on survey.

The results of the survey presented in Table 3 indicate that higher education has a favorable effect on the use of electronic banking. Specifically, 89.2% of respondents have some knowledge

in this area, and the level of education has a positive effect on the availability of information. A total of 55.4% of individuals who possess knowledge about electronic banking have attained a higher education. The findings of the conducted research provide empirical support for the hypothesis that an individual's level of education exerts an influence on the availability of information and awareness of the possibilities of using electronic banking services.

To conduct an analysis of the comparison of respondents' answers about the reliability and quality of electronic banking services, the data should be displayed in the form of Table 4.

Table 4. A Two-Way Analysis Between Reliability and Quality of Electronic Banking Services

Degree of Reliability/ Quality	Professional	Sufficient	Low	Together
Reliable	86	59	10	155
Part, %	35.84	24.58	4.17	64.59
Risky	0	26	6	32
Part, %	0	10.83	2.5	13.33
Not reliable	0	0	14	14
Part, %	0	0	5.83	5.83
There is no information	6	33	0	39
Part, %	2.5	13.75	0	16.25
Together	92	118	30	240
Part, %	38.33	49.17	12.5	100

Source: compiled by the authors based on survey.

Table 4 shows that about 65% of customers consider the e-banking service as reliable, 13% of respondents consider this service as risky, and 5.8% as unreliable. According to the results of the survey, about 16% of respondents do not have information about either the reliability or the quality of services.

The conducted analysis shows that representatives of the banking sector should work on improving people's perception of the quality and reliability of electronic banking services, since the level of respondents who would like to use these services, according to the data in Table 4, is 92%, and those who use them is 70%. This suggests the existence of perceived constraints on the provision of electronic banking services, which require greater attention from banking sector employees to facilitate future enhancements.Therefore, the research confirms the hypothesis that the perceived usefulness of electronic banking services is related to the extent to which the potential user assesses their quality level. An important role is also played by the availability and flexibility of information channels.

To enhance the future development of electronic banking services, a number of potential strategies may be considered. These include the expansion of the range of electronic banking opportunities and the introduction of price incentives. This implies that the client, having the opportunity to perform all necessary operations with the assistance of electronic banking, will gain a greater advantage than a prolonged

stay in a queue at a bank branch. Furthermore, online transactions should be entirely free or significantly less expensive than transactions conducted at physical branches and banks.

However, it should be noted that clients in the financial sector are not ready to use only online channels for communication. Personal contact is beneficial and important, so banks should keep this in mind when promoting services. Therefore, it is impossible to predict which channels of communication with customers will be exactly successful, and it is also impossible to use only one channel, particularly the Internet.

In the context of the accelerated development of digital technologies, it is imperative that bank representatives utilize innovative products that are actively promoted, as this increases the likelihood of their successful dissemination. The advent of electronic banking is contingent upon the existence of a sufficient level of Internet penetration within a given country, as well as the capacity of banks to provide a comprehensive array of services. This will result in the satisfaction of users of the service, who will then act as promoters of the service. Nevertheless, it is also essential to maintain personal communication with the client.

The analysis of the development of the banking system of Albania showed that during the years 2010-2022 the number of electronic services increased, the infrastructure for their provision was expanded, and a gradual transition of customers to the use of payment instruments using the Internet technologies and electronic money was observed. The conducted survey of Albanians of different ages, gender, education, and income levels regarding their attitude and trust in electronic banking services allowed determining the relationship between the socio-demographic features of the client and the possession of information about the electronic services of banks in Albania. A study that was also conducted made it possible to conclude that people who might want to use electronic banking services do not have enough information about their reliability and quality, which indicates the presence of perceived limitations for using electronic banking.

DISCUSSION

The introduction of digital technologies has facilitated the expansion of electronic banking services in Albania. This has resulted in a number of advantages for customers, including enhanced convenience in conducting banking transactions, while banks have also benefited from reduced costs associated with the provision of banking services to customers. Despite the advantages of electronic banking, clients of banks in Albania use these services to a relatively limited extent. This indicates a need for banking institutions to develop mea-

sures that will help to increase clients' trust in electronic banking services.

The work examines various factors that can influence the willingness of Albanian bank customers to use electronic services and emphasizes that satisfaction with these services depends on their quality, specially safety and availability.

In a different order of ideas, the study of the impact of the quality of electronic banking services on customer satisfaction and loyalty in the Ethiopian banking industry was carried out by Ayinaddis et al. (2023). The scientists conducted a survey using a questionnaire among 385 participants. The results indicated a significant impact of variables such as responsiveness, reliability, security, and privacy. Moreover, customer satisfaction with the quality of electronic banking services affects their loyalty. In agreement with the aforementioned viewpoint, it is of significant importance to note that banks must direct their efforts towards the enhancement of the speed of response, reliability, and availability of their systems, with the objective of maximizing customer satisfaction and loyalty. Likewise, a study of customer attitudes towards Internet banking in the city of Pokhara, which is the tourist capital of Nepal, was conducted by Shrestha et al. (2020) on the basis of data collected through a customer survey. The findings of the authors' research facilitated improvements in communication between banks and their clients, while simultaneously reducing the costs associated with the expansion of their product portfolios.

According to the results of the analysis, it was emphasized that the factors that influence the desire of consumers to use electronic banking services are the awareness of the usefulness of electronic banking, saving time for making payments and lower costs for bank commissions compared to the cost of transactions carried out through bank cashier.

A comparable perspective is espoused by Ismael et al. (2021). The authors examined the factors influencing consumers' intention to use not only Internet banking but also other digital financial services in Egypt. Their findings demonstrated that perceived usefulness and trust by customers significantly and positively influence consumers' intention to use digital financial services. At the same time, Vovchenko (2021) and Niyazbekova et al. (2023) emphasized that ease of use, perception of risks and cost do not affect consumer intentions. In addition, Aboobucker (2020) conducted a survey of 186 bank customers, which demonstrated that the perceived usefulness and convenience of using electronic banking influence customers' intention to use it. However, perceived ease of use and awareness did not show a significant relationship, and age and gender did not cause a significant moderating effect.

We must totally agree with the scientist Le-Hoang (2021) that among the most important factors that contribute to the use of electronic banking by clients, the following can be highlighted: ease of use, usefulness, trust, expected efficiency, social influence, promotion. However, the scientist identifies expected efficiency as the least influential factor. Specifically, confirming these factors, Karim et al. (2020) determine that perceived security has a stronger influence on trust and perceived ease of use. Instead, Majumdar and Pujari (2021) rightly note that the perception of usefulness and availability of information are among the main factors that influence the adoption and level of use of mobile banking programs in the United Arab Emirates.

In examining the factors that influence consumer behavior regarding electronic banking services, it is essential to consider the impact of changes in the network of bank branches, including the opening of new branches or the closing of existing ones. Thus, Zhou et al. (2020) showed that the opening of branches increases the number of customer transactions, but the opening of the first branch may lead to a decrease in the use of online banking in the short term, and vice versa, the closing of branches promotes the migration of customers from the branch channel bank to online banking.

Agreeing with the scientists' point of view, it should be noted the existence of interdependence between the change in the number of working bank branches and the decrease or increase in the use of electronic banking by clients. Similar research on the example of retail trade was conducted by Kumar et al. (2019), whose found that the opening of sales points led to an increase in online purchases by store customers, explaining this consumer behaviour by the fact that customers make more online purchases due to increased interaction with the store, while thereby experiencing a reduction in the risk of online shopping due to the possibility of returning the product to the store. Considering the aforementioned conclusions, it is evident that the banking sector can benefit from a similar approach. In this case, the distribution channel is the bank branch, which can be utilized to stimulate the use of banking services.Clients' awareness of the risks or safety of making payments by electronic means undoubtedly influences their use of such means. A study of the influence of perceived ease of use and perceived risk on the intention to make payments through a mobile phone among the population of Pakistan was conducted by Islam et al. (2020). The study emphasized that the perception of risk is considered a significant negative factor for establishing trust from consumers.

A significant impact on the expansion of the use of electronic services was caused by the introduction of restrictions due to the spread of the COVID-19 pandemic. A study in this direction was

conducted by Hoxhaj and Muharremi (2022), who evaluated the influence of the following factors on the use of online banking during the pandemic: age, gender, education, income level, perception of security, usefulness, and ease of use. The researchers emphasized that the convenience, speed, and ease of use of online services did not affect the use of online banking during the pandemic.

In addition, the actual and potential impact of the pandemic on the financial markets has been studied by Wójcik and Ioannou (2020), who aptly note that the use of new financial technologies is likely to accelerate, affecting retail banking in particular. The paper emphasizes the advantages of using electronic banking in comparison with performing payment operations at the cash desk of a bank branch and highlights the economic benefits of this method of performing operations. Likewise, Jolly (2016) notes that clients can use electronic banking to carry out almost all banking operations, requiring only an Internet connection. Among the advantages of electronic banking, the researcher mentions: simplicity, 24-hour access to operations, and economic efficiency.The study on the influence of the quality of electronic services in retail online banking on customer satisfaction during the restrictions of the COVID-19 pandemic was carried out by Mwiya et al. (2022) and found that security, privacy, speed of response, efficiency, execution, and reliability are definitely related to the quality of electronic services and affect customer satisfaction. Emphasizing the need to improve the quality of electronic services, it should be noted that improving these indicators in the Albanian banking sector will contribute to increasing customer satisfaction and the use of online banking.

Furthermore, the direct impact of the quality of electronic banking services on the satisfaction and loyalty of customers of the Commercial Bank of Ethiopia in Bahir Dar was investigated by Beshir and Zelalem (2020). The authors identified seven dimensions of service quality: efficiency, reliability, speed of response, ease, product portfolio, privacy, and cost. The findings of the study conducted by the scientist indicated a significant impact of efficiency, responsiveness, ease, privacy, and commission on satisfaction, as well as a significant effect of satisfaction on loyalty.

Consequently, an analysis of the findings of previous research conducted by other scientists on the impact of various factors on the formation of bank customers' satisfaction, trust, and intention to utilize electronic banking services in the future reveals a genuine concern regarding this issue. The majority of scientific research was conducted based on the results of customer surveys. The results of the aforementioned research indicate a correlation between customers' perceptions of the reliability and quality of electronic banking and their

willingness to utilize these services. This finding is corroborated by the perspectives of other scientists who advocate for enhanced communication between banks and customers to facilitate the growth of electronic banking.

CONCLUSIONS

The research shows that in modern conditions of the development of information and telecommunications technologies, banking tools for carrying out operations tend to be transformed into electronic format, making them more convenient for clients and economically more profitable for the banking sector.

The goal set in this work and the analysis of the main problems of the attitude of Albanian bank customers to electronic services allowed us to formulate the following conclusions. The analysis of the development of the banking system of Albania during 2010-2022 was characterized by a significant increase in the number of bank accounts with access to the Internet, the rapid dynamics of the expansion of the banking infrastructure, which provides the opportunity to use electronic banking services. It was established that the number of POS terminals, 83% of which are concentrated in Tirana, the capital of Albania, had the greatest growth dynamics. It was found that starting from 2018, the part of credit transfers in paper form decreased and the total volume of such transfers increased in electronic form. By conducting a survey among the population with different demographic characteristics, it was found that for more than 60% of respondents, the main source of income is the salary of an employee, and Raiffeisen Bank (31%) and Credins Bank (29%) are the most chosen banks.

The results of the study on the relationship between customers of banks in Albania and their use of electronic banking information, in conjunction with the level of education of the population, have confirmed the hypothesis that respondents with higher education levels possess greater knowledge of banking services and are more frequently aware of the benefits of electronic banking. It is evident that a significant proportion of customers (60.3%) consider electronic banking services to be reliable, while 13% perceive them as risky and 5.8% as unreliable. It is argued that the number of bank clients who would like to use electronic banking services is greater (92%) than those who already use them (70%). This indicates the presence of perceived limitations and the need to improve the work of bank employees with clients in the direction of clarification for them the benefits of using electronic banking.

The hypothesis that the expected usefulness of electronic banking services is related to the degree of the client's assessment of their quality level was confirmed through the analysis of the dependence between reliability and

quality of electronic banking services. It is justified that in order to improve the attitude of customers towards the use of electronic banking, it is imperative to enhance the security, confidentiality, and availability of these services, which will increase the trust of customers and stimulate the desire to use them. To improve electronic banking services, it is proposed to expand the range of possibilities of these services and to develop price lists of incentives that provide for the transfer of online transactions to a free basis or a reduction in their cost compared to transactions in branches and banks.

The proposal has practical significance and can be applied by the Government of Albania in the development of financial and credit policy and decision-making on the use of electronic technologies in the banking sector. Furthermore, it can be utilized by bank managers and employees in the development of strategies for communicating with clients, explaining to them the benefits of using electronic services and for marketing planning in the banking sector in Albania.

The primary focus of future research will be on the identification of the factors that contribute to the imposition of restrictions on customers' use of electronic banking services.

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DECLARATION OF CONFLICTS OF INTEREST

The authors of this article declare that they have no conflicts of interest.

AUTHOR'S CONTRIBUTION

Armelina Lila was instrumental in conceptualizing the research, curating and analyzing data, conducting investigations, developing methodology, administering the project, managing resources, supervising the process, validating results, visualizing data, and drafting the original manuscript.

Christian Tanushev was involved in conceptualization, literature review, methodological development, data collection, fieldwork, and contributed to both drafting and editing the manuscript.

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Environmental Sustainability in South America

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Abstract: The purpose of this article is to determine the similarities in the context of environmental practices and sustainability of twelve South American countries and compare the environmental sustainability performance with six principal components. A multivariate analysis as a hierarchical method was carried out with seventeen sustainable environmental indicators, using official secondary data sources, namely the databases of ECLAC (Economic Commission for Latin America and the Caribbean), applying eigenvectors and eigenvalues from the correlation matrix and Ward's method with squared Euclidean distances.

The results suggest that the initial jumps in terms of distance are small, so the twelve countries analyzed in the study are grouped into five clusters. Deepening then in the perspective of the characteristics of each cluster, CL1: Colombia, Venezuela, Suriname, Argentina and Bolivia; CL2: Guyana, Paraguay, Uruguay and Peru; CL3: Brazil; CL4: Ecuador; CL5: Chile. The research highlights significant differences among these South American countries, clustering those with similar patterns of behavior and identifying the best performers. We argue there is a need to protect and promote biodiversity, raise awareness of the importance of environmental sustainability and support the impacts of climate change. Argentina, Uruguay and Chile face severe water scarcity problems, and temperatures have risen in all the countries, but especially in Brazil, Colombia, Ecuador, Paraguay, Suriname and Venezuela.

Keywords: environmental sustainability, South America, multivariate analysis, sustainable environmental indicators.

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La sostenibilidad medioambiental en América del Sur

Resumen: El propósito de este artículo es determinar las similitudes en el contexto de las prácticas ambientales y la sostenibilidad de doce países de América del Sur, y comparar el desempeño de la sostenibilidad ambiental con seis componentes principales. Se realizó un análisis multivariado como método jerárquico con diecisiete indicadores ambientales sostenibles; se consultaron fuentes de datos oficiales secundarios, a saber, la base de datos de la CEPAL (Comisión Económica para América Latina), aplicando el vector propio y los valores propios de la matriz de correlaciones y el método de Ward con distancias euclidianas al cuadrado.

Los resultados sugieren que los saltos iniciales en términos de distancia son pequeños. En consecuencia, los doce países analizados en este estudio se agrupan en cinco clusters. Profundizando luego en la perspectiva de las características de cada cluster, CL1: Colombia, Venezuela, Surinam, Argentina y Bolivia; CL2: Guyana, Paraguay, Uruguay y Perú; CL3: Brasil; CL4: Ecuador; CL5: Chile. La investigación pone de relieve diferencias significativas entre estos países sudamericanos, agrupando a los que presentan patrones de comportamiento similares e identificando a los que obtienen mejores resultados. Argumentamos que hay que proteger y fomentar la biodiversidad, y concienciar sobre la importancia de la sostenibilidad medioambiental y apoyar el impacto del cambio climático. Argentina, Uruguay y Chile se enfrentan a graves problemas de escasez de agua y las temperaturas han aumentado en todos los países, pero especialmente en Brasil, Colombia, Ecuador, Paraguay, Surinam y Venezuela.

Palabras clave: sostenibilidad ambiental, América del Sur, análisis multivariante, indicadores ambientales sostenibles.

Códigos JEL: P48, C38, Q1, H11, N56.

INTRODUCTION

In considering global sustainability, it is necessary to address human, animal, plant and environmental health as inseparable aspects of an interlinked challenge (United Nations Environment Program [UNEP], 2022). The vital role played by environmental, social and economic sustainability is acknowledged by academics and policymakers alike. Environmental sustainability theory argues that for an organization to gain and maintain sustainable competitive advantage, it must balance economic, environmental and social interests, and recognize current and future needs in each of these areas (Olafsson et al., 2014).

In this context, benchmarking is the application of uniform measures to assess performance. Successful benchmarking of environmental sustainability performance requires adequate disclosure of information, regarding all levels of governance (Alcaraz-Quiles et al., 2014). Relevant aspects of environmental performance include climate change, air quality, waste generation, water quality, water resources, forest resources, energy resources (Ponomarenko et al., 2022), biodiversity and environmentally-related taxes. These areas of concern have been addressed by many public administrations, and various international conventions in this respect have been approved and ratified in recent years (Organisation for Economic Co-operation and Development [OECD], 2022). Focusing both on individual countries and on continental regions, international organizations have sought to evaluate environmental sustainability performance, emphasizing the need to strengthen efforts to mitigate and adapt to climate change and urban pollution (Gómez Peláez et al., 2020; Klumpp et al., 2023), and to protect and restore the natural world.

This paper examines and compares the environmental sustainability performance of twelve South American countries. Previous research in this area is limited in its instrumental and rationalistic conceptualization and very few cross-country benchmarking performance case studies have been

presented. Moreover, few studies have reported on the current understanding of environmental sustainability (Crabb & Leroy, 2008; Da Cruz & Marques, 2014; Ammons & Roenigk, 2015), or on policies, agreements and successes in this area. In this paper, we argue that environmental sustainability performance depends on ecosystem services at local, national and international scales, and that governance systems have a duty of care towards environmental infrastructure (Olafsson et al., 2014), including information disclosure on sustainability-related outcomes.

Assessing the environmental outcomes of sustainability initiatives is a complex issue. The broad scope of the Economic Commission for Latin America and the Caribbean Statistical Databases and Publications (CEPALSTAT) indicators reflect the UN's aim to enhance environmental protection policies worldwide and help measure national progress in South America. Especially important among these indicators are the six principal components (PC) or constructs that are characterized by 17 environmental indicators (Table 1).

With these considerations in mind, this paper aims to evaluate the environmental sustainability performance of twelve South American countries, considering data published in 2019. According to Alcaraz-Quiles et al. (2014), an evaluation of national performance in implementing sustainable development policies and of the corresponding legal measures adopted would lack practical application without reference to the sustainable development guidelines that have arisen from considerations of global governance. In the present analysis, therefore, we evaluate environmental sustainability performance to better understand the complex modus operandi of international organizations, countries and regions in developing new indicators of environmental phenomena and their subnational, national and supranational effects.

The Global Reporting Initiative (GRI, 2022) provides the world's most widely used standards – the GRI Standards – for sustainability reporting. Specific environmental areas are commonly assessed in terms of the key indicators proposed by the OECD (2022), together with the World Development Indicators that have been published by the World Bank since the 1960s. The use of these and other indices of environmental sustainability informs policymakers and society at large of the relationships and trade-offs among the environmental, social and economic dimensions of sustainability (Goodland, 1995).

In this paper, we focus on six principal components of environmental sustainability: secondary energy production and change in energy intensity, the proportion of marine protected areas for the conservation of biodiversity, the contribution to the persistence of marine biodiversity, the proportion of areas dedicated to the conservation of

terrestrial and marine biodiversity, the impact of global warming, and measures taken to address pollution and overexploitation of the oceans.

After critically discussing the core ideas of environmental sustainability, we elaborate on the main features highlighted in our review of the literature, including a subsection of studies focused on the context of South America. Finally, we identify and discuss the significant differences observed among these countries in terms of their environmental sustainability performance, and construct a profile to define the results obtained, in five clusters.

In short, this paper reveals patterns of behavior in the countries considered, according to the different initiatives adopted, and illustrates the benefits of benchmarking these outcomes. This research has the following practical implications: we identify the best performing countries, thus facilitating the creation of benchmarks for their neighbors, and suggest possible environmental performance improvements, hence strengthening sustainability. In this regard, Ammons et al. (2001) and Rutherford (2000), among others, have commented that effective benchmarking requires that uniform measures be applied. In another study, Alcaraz-Quiles et al. (2014) considered the disclosure of information about sustainability by different government agencies.

The literature on environmental sustainability in South America is mainly descriptive and non-academic, a research gap that the present study seeks to fill. Accordingly, we address the following research questions:

RQ1: How have these 12 South American countries evolved in terms of environmental sustainability and how are they now positioned regarding the provision of indicators to support benchmarking?

RQ2: What similarities and differences can be observed among the indicators of environmental sustainability in these countries?

RQ3: What behavior patterns can be observed regarding the use of environmental sustainability indicators?

RQ4: Can some countries be identified as benchmarks for others, in terms of their environmental sustainability behavior?

The rest of this paper is organized as follows. In the next section, we present a literature review of environmental sustainability in the 12 countries considered. We then conduct an empirical analysis, explaining the data and methodology used. This is followed by a presentation and discussion of the findings obtained. Finally, we summarize the main conclusions drawn.

LITERATURE REVIEW

Environmental Sustainability

The UNEP publishes data on 30 major indicators, including air pollution, climate change, greenhouse gases, biodiversity, energy and minerals, forests, governance and inland water resources. According to the UNEP report (2022), the devastating impacts of climate change, pollution, waste and the degradation of the natural world have been compounded by widening inequality, conflict in Ukraine and elsewhere and rising prices for food and energy. And as always, the poorest and most vulnerable populations have been hardest hit by impacts such as drought, flooding, wildfires, and the loss of biodiversity.

Numerous academic studies and environmental sustainability institutions, including Sun et al. (2020), Olafsson et al. (2014) and Alcaraz-Quiles et al. (2014), have considered the measurement and assessment of sustainability performance, noting that the selection of appropriate indicators is a dynamic question that must be addressed in accordance with the requirements and priorities assumed. If an accurate evaluation can be achieved, this will enable policymakers to identify and apply the policy measures needed to strengthen environmental sustainability in the context considered. In response to this perceived need, international organizations such as the OECD (2022), the World Bank (2022), GRI (2022) and UNEP (2022) have developed performance indicators to assess environmental sustainability.

The environmental sustainability indicators published by CEPALSTAT (2022), the statistical databases and publications portal of ECLAC, are the metrics most used to measure specific areas of physical conditions, ecosystems and biodiversity, including environmental quality, energy resources, biological resources, water resources, atmospheric emissions, waste production and disposal, and natural events and disasters. Ecological indicators and 3 dimensions assess sustainability in 11 Latin American countries (Toumi et al., 2017).

In addition, consideration must be given to novel challenges such as the role of AI and its impact on sustainability action and governance as a referent in policies for international sustainability to ecological modernization, the green government movement and civic environmentalism need consideration (Francisco & Linnér, 2023). These emerging interactions have showed the relation of environmental sustainability to Corporate Social Responsibility (CSR) practices and green innovation (Shahzad et al., 2020).

Environmental Sustainability in South America

In this section, we review the literature on environmental sustainability issues

as they affect diverse countries in South America.

The challenge of assessing environmental performance has been taken up by many public administrations and international organizations, using appropriate indicators of environmental phenomena and their impacts, whether regional, national or supranational. Among them, the OECD Key Indicators (2022) are commonly used to measure specific areas of environmental concern, such as climate change, air quality, waste generation, water quality, water resources, forestry resources, energy resources, biodiversity and environmentally related taxation. In addition, the World Bank has proposed World Development Indicators (WDI) focusing on agriculture, climate, energy and mining, environment, urban and rural development, water and sanitation, among other areas. These indicators can be analyzed to reveal a country's progress towards achieving the environmental goals set out in the 2030 Agenda for Sustainable Development (World Bank, 2022). The GRI Standards are currently the most widely used measures of sustainability reporting and corporate accountability.

According to Sun et al. (2020), the above indicators are an invaluable resource for policymakers, providing them with meaningful information for monitoring and comparing the outcomes of procedures adopted. Another useful tool is the 2022 Environmental Performance Index (EPI), which shows, for example, that Nordic countries score highly for sustainability, via longstanding investments in policies to protect environmental health, preserve biodiversity and natural habitats, conserve natural resources and decouple greenhouse gas emissions from economic growth. Denmark tops the 2022 EPI rankings, thanks to its strong performance across nearly all the issues considered.

Gallego-Álvarez et al. (2018) used the EPI indicators and the HJ-Biplot multivariate analysis methodology to analyze the variables that might influence microeconomic policies and their effect on investment in 24 Latin American countries. These authors concluded that Argentina, Chile and Brazil were the countries in this region most concerned about climate change. Hermosa et al. (2024) propose e-AI based on Global Reporting Initiative GRI survey, enhancing governance and website accessibility for South American disclosure. In recent years, the forest area has shrunk dramatically and became fragmented, due in part to the prolonged drought that has affected many parts of South America, for example, Central Chile from 2010 to 2017. This deforestation and the consequent loss of biodiversity is just one of many negative effects of climate change. Miranda et al. (2020) discussed the effects of geographical variation and forest type as indicators of drought, using data from the MODIS satellite sensor, and temporal trends in the

Normalised Difference Vegetation Index in a highly threatened Mediterranean landscape of South America.

Water resources are of vital importance, both for the environment in general and for human life in particular (Shiklomanov, 1998). South America has almost one third of the world's renewable water resources, and Brazil, Colombia and Peru are among the top ten countries in this respect (Global Water Partnership [GWP], 2022). Nevertheless, several regions, for example in Argentina, Uruguay and Chile, are subject to severe water scarcity, causing crop losses, jeopardizing food security and human health and endangering ecosystems (United Nations, 2023). Furthermore, Ecuador, Paraguay, Bolivia and Venezuela present high levels of eutrophication (excessive presence of nutrients such as phosphorus and nitrogen) due to uncontrolled agricultural activities and wastewater discharge.

Paredes-Beltran et al. (2021) applied the Water Availability and Adaptation Policy Analysis (WAAPA) model to evaluate water storage and its influence on the river systems of South America. The study results show that water availability is greater in the southeast, which the authors suggest is due to the widespread development of hydraulic infrastructure in this area of the continent. Reflecting this understanding, several countries have announced their intention to build hundreds of new dams, for a variety of purposes. Darré et al. (2019) discussed experiences and situations related to impacts on water use and quality by reference to rainfed and irrigated systems for corn and soybean production in temperate regions. These authors concluded that soybean cultivation was more susceptible to ecotoxicity and has a greater environmental impact than corn production.

Analysis of the EPI (2022) shows that accumulated emissions in the form of air pollution, effluent flows into waterways, mismanaged waste, chemical releases and greenhouse gases harm human health and ecosystems. To counter these negative impacts, many countries have enacted policies to significantly reduce their greenhouse gas emissions. In this respect, Denmark and the United Kingdom plan to reach greenhouse gas neutrality by 2050; however, China, India and Russia are still heading in the wrong direction.

Best practices for environmental sustainability include sustainability benchmarking and information disclosure at various levels of government (Alcaraz-Quiles et al., 2014), to facilitate meaningful international comparisons and long-term monitoring (Del Campo et al. 2021; Gallego-Álvarez et al., 2018). The adequate availability of information enables policymakers and others to assemble metrics and tools to gauge the adequacy of national policies, thus providing a mechanism for holding governments to account (EPI, 2022;

CEPALSTAT, 2022; World Bank, 2022). Stakeholder concerns in the development of sustainability policies led to the adoption of the UN Framework Convention on Climate Change (UNFCCC, 2021), as an international initiative to collaborate for the greater good. Policymakers in the European Union have observed that policies favoring environmental sustainability can also produce competitive advantages for their proponents (Boasson & Wettestad, 2016), and promote the legislation of the Inflation Reduction Act (IRA), which aims to promote renewable energy and reduce dependence on fossil fuels in the global economy (Ma et al., 2024)

Thus, indicators of environmental sustainability can function as a social tool, enabling stakeholders to identify and analyze differences in environmental performance assessments by policy category, objective and country. Porter (1991) suggested this would generate a win-win situation, in the sense that environmental policies benefit the environment and at the same time enhance competitiveness. These outcomes are evidently much sought after by policymakers, in view of the growing number of green "new deals" and "net zero" carbon emission pledges being made at the national level. However, there is a marked gap between the environmental policy data needed and the real supply of reliable indicators and indices (Herman & Shenk, 2021).

Most South American countries have made significant recent progress in regulating environmental sustainability (see Appendix A), with particular reference to critical water issues, to protect and manage this increasingly scarce resource. In many cases, governments are making increasing use of visioning, back casting and adaptive environmental management to anticipate and respond to change, complexity and uncertainty, whilst pursuing effective implementation, monitoring and evaluation (Mitchell, 2013). Furthermore, many have ratified international agreements in this respect, such as the Paris Agreement on Climate Change (except for Chile and Ecuador) and have established agencies to protect biodiversity and protected areas and to prosecute cases of criminal responsibility. However, climate change remains uncontrollable, since factors such as global warming, excessive greenhouse gas emissions, and the use of fossil fuels (Kiehbadroudinezhad et al., 2024), losses of biodiversity and improper waste management will continue to prevail. Notwithstanding, and as highlighted by Paredes-Beltrán (2021), EPI (2022), Del Campo et al. (2021) and Miranda et al. (2020), the countries of South America are well aware of the extreme gravity of the environmental problems facing the region. Few studies have assessed and compared regional trends in environmental sustainability in South America. Major barriers to this type of research include, weak regional monitoring, limited coverage, varied

measurement techniques, and complex access to air quality data (Clean Air Institute, 2013).

DATA AND METHODOLOGY

Sample Location and Availability

This paper aims to evaluate the environmental sustainability performance of twelve South American countries (Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay and Venezuela), according to data published in 2019, the CEPALSTAT database (see Table 1) and survey data published by the ECLAC, one of five regional commissions established by the United Nations (UN) to contribute to economic development (Martínez, 2019), and the similarities and differences can be observed among the indicator practices in these countries of two statistical methods, Principal Component Analysis (PCA) and Cluster Analysis (CA).

The study data reflect the similarities and disparities among the countries in terms of the following dimensions: production of secondary energy and change in energy intensity, proportion of protected marine areas for the preservation of biological diversity, contribution to the persistence of marine biodiversity, proportion of protected areas to preserve terrestrial and marine biodiversity, global warming, pollution and overexploitation of the sea.

Principal Component Analysis (PCA)

In this study, indicators of environmental sustainability are determined by means of principal component analysis (PCA), a multivariate technique which identifies latent variables that while not directly observable can be inferred (via a mathematical model) from other variables that are observable and can be measured directly. With this approach, the degree of environmental responsibility and sustainability (of an individual, organization, community or country) can be quantified.

The increasing demand by countries for information on the status of their natural resources and marine biodiversity has led to the creation of databases and the development of methodological and statistical capacity to produce reliable indicators of the results of the environmental sustainability policies applied by countries or regions. Such actions produce long-term effects, justifying our use of multivariate techniques in their analysis. This study of environmental sustainability and its correlation with supporting statistical data was conducted in order to quantify sustainability in terms of environmental indicators. Moreover, the development of an optimal system of indicators helps to explain the dynamics of environmental sustainability and the goals achieved.

The multidimensional approach taken to the system of environmental sustain-

ability indicators reflects the complex reality of national systems and of each of the components involved in the transformation of urban and rural productive activity. Each dimension of the system has its own characteristics; it both constrains and is conditioned by the other dimensions (Sepúlveda et al., 2002). To achieve sustained growth and development, institutional actors and economic agents must be aware of current stocks of renewable natural resources and the environment in which they operate and be capable of managing them from a long-term perspective.

In our analysis, the measurement of environmental sustainability is associated with the concept of *construct*, as a means of understanding the data, goals and thresholds of sustainability with a high level of abstraction. Constructs are subjective variables designed to measure the changes implicit in a given phenomenon or process. They are objectively verifiable and replicable, and are considered analytical tools that facilitate the measurement of the hidden changes within a system that manifest themselves in observable variables. Principal Component Analysis (PCA) is a technique from statistics for simplifying a data set. It was developed by Pearson (1901) and Hotelling (1933).

In our study, in order to avoid problems arising from the use of different measurement scales, all variables are standardized by transformation into z-scores with a mean of 0 and a standard deviation of 1. This approach is used to configure the correlations present in a set of observed variables. Appropriate environmental sustainability constructs are derived by means of a multivariate analytical approach (Glave & Escobal, 1995), i.e., principal component analysis (Pearson, 1901; Hotelling, 1933, 1936). The first such approach employed is that of an unsupervised learning algorithm, which uses multivariate statistical techniques to reduce the original seventeen variables to six, the minimum number that reflects the variability in the data set with minimal loss of information (see tables 1 and 2).

Cluster Analysis (CA)

Cluster analysis is well established and can be applied as a hierarchical method or as a k-means method. The hierarchical method divides a set of individuals (in this case, countries) into smaller groups, so that those belonging to the same set are very similar to each other, but very different from those assigned to other groups −i.e., there is inter-group homogeneity and intra-group heterogeneity− (Kaufman & Rousseeuw, 2009).

In our study, cluster analysis makes it possible to obtain a typology of countries such that each cluster corresponds to certain patterns of behavior and performance in terms of environmental sustainability. Among other outcomes, this analysis identifies the countries with best practices in terms of the envi-

ronmental indicators considered and shows how they have evolved over time.

The results obtained could facilitate the benchmarking of environmental practices and hence foster improvement. Based on the indicators described, we identify the groups of countries that present similar characteristics and those that behave as outliers and highlight their most important features and their role in the South American context.

Furthermore, as the study variables are cross-sectional (referring to 2019), we also considered model-based clustering. Finally, the fact that only twelve countries were included in the analysis means that the complexity related to large databases, which is one of the main drawbacks of hierarchical methods (Aghabozorgi et al., 2015), was not experienced.

In the multivariate methodology applied in this study, eigenvectors and eigenvalues are extracted from the correlation matrix. From the eigenvalues, we obtain the proportion of variance explained by each component of the total variance present in the data set of interest. Since the sum of the eigenvalues quantifies the total variance explained by the factors, we seek to maximize this proportion. In this selection process, it is important to consider only those components that contribute most to explaining the total variance. A criterion commonly adopted is that at least 80% of the total variance should be explained, such that the significant reduction obtained in the dimensionality of the original data set produces the least possible loss of information.

The results thus obtained are then evaluated with the eigenvectors, to determine how the variables behave in each of the different components, and to obtain elements for their definition. An important consideration is that the lower the eigenvalues the more difficult it becomes to define the components on the basis of the eigenvectors, i.e., the less the component explains the variability of the data. Having identified the indicators that impact on environmental sustainability, we now make further use of multivariate statistics (cluster analysis) to generate country profiles according to the environmental practices observed.

Under the clustering method applied, we first grouped the two closest elements and then successively combined pairs of elements, gradually forming larger groups until all the elements were incorporated. This process can be interrupted at any level of the clustering “tree” created, thus enabling the desired number of groups to be obtained directly. In this process, it is useful to calculate a metric of cluster quality (minimizing the distance between data elements in the same cluster and maximizing the distance with respect to the other clusters) to determine an appropriate cutoff level.

In this study, hierarchical cluster analysis was applied, using Ward's method with squared Euclidean distances, which from practical experience produces the best results in this type of situation (Ward, 1963). A formal, rigorous description of these techniques can be found in Everitt et al. (2011), Hair et al. (2009) and Kaufman and Rousseeuw (2009). See also Aghabozorgi et al. (2015) for an exhaustive review of clustering time series.

The above-described cluster analysis enables us to obtain the proximity matrix from the data matrix X of order *nxp* and to construct the distance matrix S of order *nxn*, where each coefficient of S, *sij*, indicates the distance between the countries of interest according to the latent variables considered, such that each value of a dissimilarity coefficient for cases *i* and *j* measures the degree of dissimilarity/distance of the individuals. This matrix is symmetric, given that *sij* = *sji*.

Table 1. Sustainable environmental indicators

No.	Abbreviation	Name	Description	Source
			Atmosphere climate and weather conditions	
1	ATV	Average Temperature Variation	This indicator contains data on the observed variations in the average surface temperature by country, with annual update.	CEPALSTAT
			Geological and geographical information	
2	CAT	Country Area (Total)	This indicator shows the total land area and inland waters of a country. Total area: includes areas occupied by inland water bodies (main rivers, lakes and reserves) and the land area of the country *divided Population* Excludes territorial waters or territorial sea.	CEPALSTAT
			Land cover	
3	PPAMA	Proportion of Protected Areas in relation to Marine Areas	This indicator shows temporal trends in the average percentage of each important site for marine biodiversity (i.e. those that contribute significantly to the global persistence of biodiversity) that is covered by designated protected areas.	CEPALSTAT
4	PTDPA	Proportion of important places for Terrestrial Diversity that constitute Protected Areas	This indicator shows temporal trends in the average percentage of each important site for terrestrial biodiversity (i.e. those that contribute significantly to the global persistence of biodiversity) that is covered by designated protected areas.	CEPALSTAT
5	PMDPA	Proportion of important places for Marine Biodiversity that constitute Protected Areas	This indicator shows temporal trends in the average percentage of each important site for marine biodiversity (i.e. those that contribute significantly to the global persistence of biodiversity) that is covered by designated protected areas.	CEPALSTAT
6	AMPA	Area of Marine Protected Areas	This indicator presents the area of marine protected zones in a country, dedicated to preserving biological diversity and associated resources. These areas, including intertidal and subtidal zones, are legally designated or protected by effective means to safeguard their environmental, historical, and cultural characteristics.	CEPALSTAT
7	PTMPA	Proportion of Terrestrial and Marine Protected Areas	This indicator presents information on the surface of total protected areas (terrestrial and marine), with respect to the total territorial area (terrestrial and marine) of a country.	CEPALSTAT
8	PMPA	Proportion of Marine Protected Areas	This indicator presents information on the area of marine protected areas, with respect to the marine territorial area of a country.	CEPALSTAT

Continuation Table 1

			Air quality	
9	CLFPM	Concentration Level of Fine Particulate Matter (PM25)	This indicator presents the annual average concentration of PM2.5 [µg/m3] in Latin America and the Caribbean. PM2.5 particles, which penetrate deep into the respiratory tract, pose health risks, increasing mortality from respiratory infections, lung cancer, and cardiovascular diseases. WHO's Air Quality Guidelines aim to reduce PM2.5 to 10 µg/m3 annually.	CEPALSTAT
			Energy resources - energy production renewable and non-renewable resources	
10	PCERNRE	Rate of change in the energy intensity of GDP (primary energy supply/ GDP at constant prices in 2010 dollars)	This indicator measures the annual percentage change in energy intensity of GDP (Primary energy supply/GDP at constant 2010 dollars). A positive rate shows increased energy intensity, indicating reduced energy efficiency, while a negative rate shows reduced energy intensity, indicating improved efficiency. It supports monitoring SDG 7.3 on energy efficiency.	CEPALSTAT
11	EP_E	Energy Production: Electricity, Secondary Energy	It corresponds to the different energy products that come from the transformation of primary energy products; their destination is the various consumption sectors and/or other transformation centers (as in the case of gasoline, electricity and liquefied gas, among others).	CEPALSTAT
12	EP_SE	Energy Production: Secondary Energy	It corresponds to the different energy products that come from the Electricity, Liquefied gas, Gasoline/ alcohol, Kerosene and turbo, Diesel oil, Fuel oil, Coke, Charcoal , Gases, Other secondary, Non-energy.	CEPALSTAT
13	ECS	Energy Consumption (secondary)	This indicator presents information regarding total, primary and secondary energy consumption in a country. Secondary energy consumption refers to production plus imports, minus exports, plus changes in reserves and minus distribution losses of all secondary energy products (which are the result of the transformation of products primary energy sources).	CEPALSTAT
14	RPPES	Renewable Proportion of Primary Energy Supply	This indicator measures the proportion of a country's primary energy supply derived from renewable sources. Renewable primary energy comes from non-fossil resources with short or continuous formation periods, ensuring sustainable availability under rational exploitation regimes without decreasing over time.	CEPALSTAT
			Biological resources	
15	CFP_T	Capture fisheries Production_Total	This indicator presents information on the total volume of capture of the following species: crustaceans, molluscs, freshwater and marine fish, aquatic plants, among the main ones. Both in continental and marine waters.	CEPALSTAT
16	AP_T	Aquaculture Production_Total	This indicator presents information on the volume of total aquaculture production, which includes freshwater and marine aquaculture. Aquaculture is the breeding and cultivation of aquatic organisms, be they fish, molluscs, crustaceans or aquatic plants. The total aquaculture production volume covers freshwater aquaculture and marine aquaculture.	CEPALSTAT
			Crops	
17	IFU	Intensity of Fertilizer Use	This indicator refers to the amount of fertilizer used by the countries. Fertilizer: Organic and inorganic substances whose chemical elements allow to stimulate the development of plants and improve soil fertility.	CEPALSTAT

Source: own elaboration

The distance matrix was obtained using the "average link between groups" clustering method and taking the squared Euclidean distance as the clustering measure (see Note 1). In statistical analysis, a similarity measure or function is a real-valued function that quantifies the similarity between two objects,

even though there is no single definition of similarity.

RESULTS

Principal Components Analysis (PCA)

From the Kaiser criterion of eigenvalues greater than one and considering the slopes of the sedimentation plot (see Figure 1), we find that 91,7% of the total variance can be explained by six principal components, which represents a significant percentage of the variability present in the data set under study (see Table 4). The following principal components were selected:

- PC1: Secondary energy production and change in energy intensity.
- PC2: The proportion of marine protected areas for the conservation of biological diversity.
- PC3: The contribution to the persistence of marine biodiversity.
- PC4: Proportion of areas protected to conserve terrestrial and marine biodiversity.
- PC5: The impact of global warming.
- PC6: Measures taken to counter pollution and overexploitation of the sea.

In terms of environmental sustainability, these indicators relate to the conservation of natural resources and biodiversity and reflect an awareness of the finite nature of these resources, of the fragility of the physical environment and of how it is affected by human activities.

This analytical perspective is related to biodiversity, climate, pollution, energy, and the efficient use of natural resources. To properly interpret the elements considered, we must examine the correlations obtained between the variables and the PCs to determine the strength of the relationship between them (Table 3). In this regard, the following results were obtained.

PC1 is significantly correlated with secondary energy production and change in energy intensity (>90%).

PC2 incorporates variables related to marine protected areas and the variety of marine life (correlations >0.9). The relationship is positive, meaning that increasing protection for marine areas would enhance marine biodiversity.

PC3 reflects the severe effects produced on the marine ecosystem by the aquaculture industry and the intensive use of fertilizers in agriculture. Among other criticisms, aquaculture is associated with the destruction of mangroves and with a negative environmental impact on receptor ecosystems, due to the excessive consumption of resources, the transformation of the habitat and the generation of the final product. The intensive use of fertilizers generates an excess of nutrients that subsequently contaminate surface water and groundwater. This component, therefore, reflects the need to protect the marine environment.

PC4 includes terrestrial biodiversity preservation practices, the generation of energy from renewable sources, and the total percentage of protected areas. This construct reflects practices of terrestrial and marine biodiversity protection.

PC5 concerns the variations in average temperature by area and in the total area of land and inland water. Thus, this component captures the impact of global warming.

Finally, PC6 combines the production of fish (including crustaceans and mollusks) with the concentration of air pollution particles. This component is an indicator of pollution and overexploitation of the sea.

Table 2. South America: principal components (PC) or constructs

Factor	Significant factor-variable correlation	Description	Label
Factor 1	EP_SE 2019. Secondary Energy Production EP_E 2019. Energy Production Electricity PCERNRE 2019. Rate of Change in the Energy Intensity of GDP. ECS 2019. Secondary Energy Consumption	Secondary energy production (kerosene, alcohol, coke, others). Electricity production (transformation of primary energy products for sectoral consumption and transformation centers). Rate of change in energy intensity of GDP (primary energy supply/GPD at constant prices in 2010 dollars). Secondary energy consumption (shows the total secondary energy consumption. Production + imports - exports + change in energy reserves - distribution of secondary energy loss).	Secondary energy production and energy intensity
Factor 2	PMPA 2019. Proportion of Marine Protected Areas AMPA 2019. Marine Protected Areas PMDPA 2019. Proportion of Important Places for Marine Biodiversity	Ratio of marine protected areas to total marine area owned by each country Marine protected areas (protection and maintenance of biological diversity) Proportion of sites important for marine biodiversity (shows the time trend of the average percentage of each site relevant to marine diversity = shows the contribution of protected sites to the overall persistence of biodiversity)	Proportion of marine protected areas for the preservation of biological diversity
Factor 3	AP_T 2019. Aquaculture Production Total PPAMA 2019. Proportion of Protected Areas in Relation to Marine Areas IFU 2019. Intensity of Fertilizer Use	Total aquaculture production (breeding and culture of aquatic organisms = fish, mollusks, crustaceans and aquatic plants). Proportion of protected areas in relation to a country's marine area (contribution to global persistence of biodiversity). Quantity of fertilizer used by countries	Contributing to the persistence of marine biodiversity
Factor 4	PTDPA 2019. Proportion of Important Places for Terrestrial Diversity that Constitute Protected Areas RPPES 2019. Renewable Proportion of Primary Energy Supply PTMPA 2019. Proportion of Terrestrial and Marine Protected Areas	Proportion or average percentage of areas protected for terrestrial biodiversity. Ratio of renewable primary energy supply (proportion of primary energy supply that comes from renewable sources, with respect to the primary energy supply that each country possesses. Ratio of terrestrial and marine protected areas (total area of terrestrial protected areas) to total land area (land and sea).	Proportion of protected areas to preserve terrestrial and marine biodiversity
Factor 5	ATV 2019. Average Temperature Variation CAT 2019. Country Area Total	Displays the observed variations in average temperature by country, as annual data. Shows the total area of land and inland water of the country (rivers, lakes, reservoirs, swamps, etc.).	Global warming
Factor 6	CFP_T 2019. Capture Fisheries Production. Total CLFPM 2019. Concentration Level of Fine Particulate Matter	Capture fisheries production. Total (catch volume of crustaceans, mollusks, freshwater and marine fish, aquatic plants, etc.). Concentration level of fine particulate matter less than 2.5 microns in diameter. Air pollution.	Pollution and overexploitation of the sea

Source: own elaboration

Our analysis revealed moderate to strong correlations between the four indicators of environmental sustainability and PC1 (secondary energy production and change in energy intensity). Positive correlations were also observed between three indicators and PC2 (proportion of marine protected areas for the preservation of biological diversity) and PC3 (Contributing to the persistence of marine biodiversity) and PC4 (proportion of areas protected to conserve terrestrial and marine biodiversity).

Conversely, the correlation with renewable proportion of primary energy supply was negative. Correlations were strong with average temperature variation and country area (total) and with PC5 (global warming), while the correlations between both fish capture production and concentration of fine particulate matter and PC6 were very high (see Table 3).

Table 3. Rotated component matrix (a)

	Component					
	1	2	3	4	5	6
Score Z: EP_SE 2019	,974					
Score Z: EP_E 2019	,974					
Score Z: PCERNRE 2019	,967					
Score Z: ECS 2019	,966					
Score Z: PMPA 2019		,957				
Score Z: AMPA 2019		,936				
Score Z: PMDPA 2019		,783				
Score Z: AP_T 2019			,904			
Score Z: PPAMA 2019			,881			
Score Z: IFU 2019			,807			
Score Z: PTDPA 2019				,923		
Score Z: RPPES 2019				-,790		
Score Z: PTMPA 2019				,762		
Score Z: ATV 2019					,845	
Score Z: 2019					,838	
Score Z: CFP_T 2019						,890
Score Z: CLFPM 2019						,730

Extraction method: principal component analysis.
Rotation method: Varimax with Kaiser normalization.
(a). The rotation has converged in 7 iterations.

Source: own elaboration

Table 4 and Figure 1 show the seventeen components with eigenvalues (coefficients applied to eigenvectors that give the vectors their length or magnitude) through the extraction method, i.e., principal component analysis (PCA).

Larger eigenvalues correlate with more important directions.

Table 4. Total variance explained

	Initial eigenvalues			Sums of squared extraction charges			Sums of loads squared by rotation		
Component	Total	% variance	% accumulated	Total	% variance	% accumulated	Total	% variance	% accumulated
1	5,961	35,066	35,066	5,961	35,066	35,066	4,586	26,977	26,977
2	2,870	16,885	51,950	2,870	16,885	51,950	2,707	15,924	42,901
3	2,615	15,385	67,335	2,615	15,385	67,335	2,688	15,810	58,711
4	1,834	10,786	78,121	1,834	10,786	78,121	2,258	13,285	71,996
5	1,262	7,423	85,544	1,262	7,423	85,544	1,775	10,440	82,436
6	1,051	6,182	91,726	1,051	6,182	91,726	1,579	9,290	91,726
7	,723	4,251	95,977						
8	,435	2,560	98,537						
9	,174	1,022	99,559						
10	,048	,281	99,840						
11	,027	,160	100,000						
12	7,857E-16	4,622E-15	100,000						
13	1,151E-16	6,771E-16	100,000						
14	2,837E-17	1,669E-16	100,000						
15	-1,241E-16	-7,300E-16	100,000						
16	-2,363E-16	-1,390E-15	100,000						
17	-4,844E-16	-2,849E-15	100,000						

Extraction method: principal component analysis.

Source: own elaboration

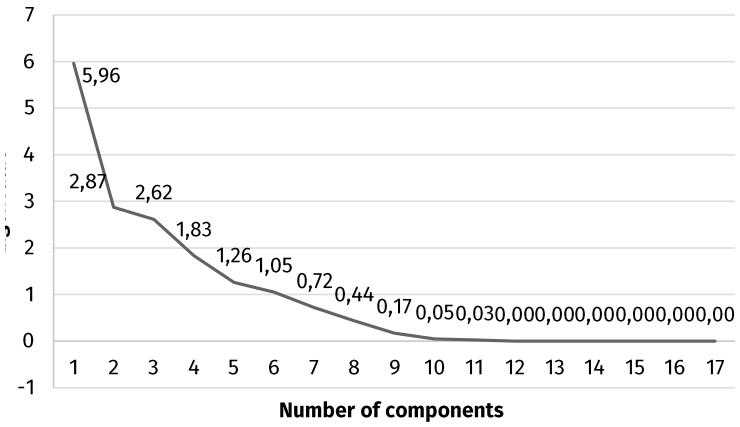

Figure 1. Sedimentation

Finally, the total variability is captured by the projections of the data onto the first principal components, so that the first component is a direction that maximizes the variance of the data, and that the i-th component can be considered as a direction orthogonal to the first i -1

principal components that maximizes the variance of the projected data.

Cluster Analysis (CA)

The distance or similarity matrix is examined in order to determine the true structure of the data under study, since many of the coefficients reported may be related. Consequently, the concordance of the results may reflect the type of grouping structure being sought, assuming that scores will be lower when these groups are more similar, and that higher scores will reflect dissimilarity. The distance matrix, thus, functions as a quantitative tool to evaluate the similarity of countries in terms of their environmental practices, enabling us to associate countries with comparable characteristics.

In the present study, the squared Euclidean distance was calculated to obtain the coefficients and hence the required grouping structure. The results of this calculation are shown in Table 5. The countries that present similarities in terms of their long-term environmental practices and sustainability are Venezuela and Colombia (0.497), Paraguay and Guyana (0.531), Suriname and Colombia (3.442), Guyana and Argentina (3.469), Venezuela and Suriname (3.670) and Bolivia and Argentina (3.705).

Table 5. Proximity matrix

Case	Squared Euclidean Distance											
	1:ARG	2:BOL	3:BR	4:CL	5:CO	6:EC	7:GUY	8:PAR	9:PE	10:SUR	11:URY	12:VEN
1:ARG	,000											
2:BOL	3,705	,000										
3:BR	26,466	29,049	,000									
4:CL	22,298	34,173	18,967	,000								
5:CO	4,188	5,193	13,179	18,717	,000							
6:EC	24,594	27,224	15,808	19,600	11,158	,000						
7:GUY	3,469	7,210	31,019	30,759	10,556	40,031	,000					
8:PAR	4,114	10,177	28,031	26,390	10,929	39,080	0,531	,000				
9:PE	7,063	12,741	18,662	16,166	6,681	17,170	9,092	8,326	,000			
10:SUR	12,924	7,646	12,962	27,609	3,442	12,150	20,167	21,910	14,519	,000		
11:URY	4,860	16,704	31,918	19,399	12,172	33,438	6,440	4,420	9,808	27,806	,000	
12:VEN	4,181	3,974	16,473	23,867	0,497	12,198	10,347	11,474	6,665	3,670	13,651	,000

Source: Own elaboration

Ecuador, Brazil and Chile present very high similarity coefficients (above two digits), which indicates that their environmental sustainability-related practices differ significantly, both among themselves and with the other countries analyzed. This disparity is reflected in the biodiversity indicators published by international organizations. Among these three countries, Ecuador presents greater degradation of biodiversity than Chile and Brazil.

In the next phase of the analysis, we construct a hierarchical classification of the twelve countries, in which the individuals are not simultaneously partitioned into clusters; instead, successive partitions are made at different levels of aggregation, following a priority or hierarchy, becoming progressively less homogeneous as the groups become larger. This successive partitioning is carried out by combining the six latent indicators identified by principal component analysis. The outcome of this process is a dendrogram showing the degree of clustering of the countries according to their similarities and differences regarding environmental sustainability practices.

To perform the above partitioning, it is first necessary to determine the number of clusters that reflect the profiles of the countries under study. This decision-making process is usually represented by an iterative algorithm and by the distances at which countries should be grouped according to their environmental profiles.

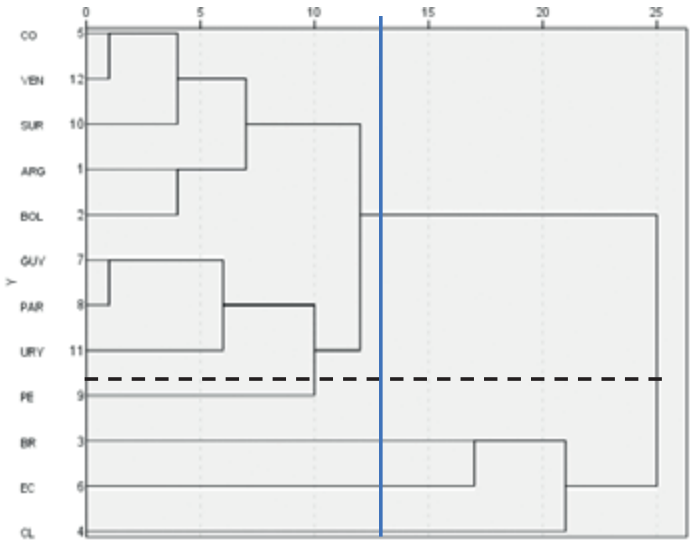

Figure 2. Clustering dendogram in South American countries

Source: own elaboration

Figure 2 shows that in this dendrogram, the initial jumps in terms of distance are small, while later jumps are more widely spaced. The cutoff point taken is the point at which sharp jumps or large distances begin to occur.

The dendogram shows that five clusters are located below the continuous line (see Figure 2). Analysis of the successive increases in the distances between the clusters (jumps on the vertical axis of the values for the intergroup sums of squares values) shows that a reasonable choice would be the five-cluster solution at a distance of ten rescaled points. This is because when more than five clusters are considered, the jumps in terms of the inter-group distances are very significant. Accordingly, the twelve countries analyzed in this study are grouped into five clusters:

Cluster 1 – Colombia, Venezuela, Suriname, Argentina and Bolivia
Cluster 2 – Guyana, Paraguay, Uruguay and Peru
Cluster 3 – Brazil
Cluster 4 – Ecuador
Cluster 5 – Chile

In the following, we detail the characteristics of each cluster.

Cluster 1. Colombia, Venezuela, Suriname, Argentina and Bolivia. These countries employ similar environmental practices, moving towards low-emission and climate change resilient economies, and promoting innovative solutions in key sectors such as renewable energy, agriculture, electromobility, financial institutions and biodiversity. Among related projects, Argentina has launched the program "Strengthening governance to implement land degradation neutrality objectives through sustainable management of forests and agricultural systems", financed by the Global Environment Facility (GEF). The aim of this program is to reduce climate vulnerability, improve land productivity and protect social fairness and environmental quality in agroecosystems, in three river basins in Argentina. Other initiatives include the joint Argentina-Bolivia project "Integrated management of water resources in the Bermejo River basin", financed by GEF, aimed at achieving the integrated planning and management of the Bermejo River basin and the sustainable use of natural resources. In Colombia, the project "Energy efficiency for the transition to carbon neutral cities" seeks to reduce CO2 emissions by increasing energy efficiency in the construction sector in the regions of Barranquilla, Montería and Pasto, via actions addressing the different stages of the life cycle of buildings and interventions in public spaces, focusing on three key components: energy efficiency in buildings and public spaces; the management of sustainable projects; and the dissemination and management of knowledge related to the environment and global warming.

Cluster 2. Guyana, Paraguay, Uruguay and Peru. These countries all present environmental problems related to the overexploitation of water resources, the emission of greenhouse gases by exten-

sive livestock farming, and the loss of biodiversity associated with agriculture due to the intensive use of chemical fertilizers and artificial farming methods and the inadequate treatment of industrial waste. These countries, hence, feature weak environmental performance and poor protection of marine and terrestrial areas.

Cluster 3. Brazil. According to the System for Estimating Greenhouse Gas Emissions (SEEG, 2021) Municipalities, part of the Climate Observatory initiative, and the online journal Expansion, Brazil is one of the worst performers among 184 countries in terms of CO2 emissions. This situation is aggravated by the uncontrolled burn-off of the rainforests, which pollutes the air breathed by millions of people and impacts on human health throughout the Amazon region, according to the Amazon Environmental Research Institute (IPAM, 2021).

Cluster 4. Ecuador. The main environmental problems facing Ecuador are deforestation, agribusiness, hydroelectric power generation, mining, and weak environmental institutions. However, the authorities have pledged to reform the energy matrix, reduce deforestation, and promote responsible, sustainable consumption. In short, this country aims to improve its environmental performance, although it is currently failing to provide adequate protection for marine and terrestrial biodiversity.

Cluster 5. Chile. Chile's main environmental problems are air pollution, water scarcity and pollution, soil loss and contamination, noise pollution, inadequate solid waste management and the loss of biodiversity. However, Chile has strengthened its environmental institutions on the basis of a multisectoral environmental coordination model. It has also stepped up its environmental initiatives in the areas of air, water, waste and biodiversity management, using innovative instruments innovative instruments (e.g. trade) and successful reforms (e.g. water services).

Figure 3 illustrates the significant heterogeneity in environmental sustainability in South America, and the performance of the countries in each of the clusters identified.

Table 6. Conglomeration history

Stage	Combined cluster		Coefficients	First appearance of the stage cluster		Next stage
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
1	5	12	,497	0	0	3
2	7	8	,531	0	0	5
3	5	10	3,556	1	0	6
4	1	2	3,705	0	0	6
5	7	11	5,430	2	0	7
6	1	5	6,351	4	3	8
7	7	9	9,075	5	0	8
8	1	7	11,661	6	7	11
9	3	6	15,808	0	0	10
10	3	4	19,284	9	0	11
11	1	3	23,859	8	10	0

Source: own elaboration

Figure 3. Environmental sustainability in 2019

Source: own elaboration

In every case, complex situations must be addressed. However, all twelve countries face certain problems that are common to all. These include deforestation, the intensive use of fertilizers in agriculture, the greenhouse effect, the pollution associated with extensive livestock farming, inadequate management of solid waste and an enormous loss of biodiversity.

The efforts of these countries to develop a sustainable economic and social policies consistent with environmental objectives are reflected in the development of appropriate regulations and in their efforts to generate quantitative indicators to monitor progress in this context.

DISCUSSION

Historically, models of national growth and development have not been linked to environmental objectives but have been used to identify the spatial distribution of economic activities, the territorial concentration of the population, the location and degree of growth of urban centers, and the types of links between certain territorial units and the rest of the national territory. However, this type of territorial distribution takes little account of its environmental consequences, especially in the medium and long term.

In practical terms, this phenomenon has generated a process of spatial differentiation in which each country or region acquires specific productive, economic and socio-political characteristics, as a functional component of a complex national development matrix, with limited environmental objectives.

The spatial differentiation thus created and the types of geographic connections established are evident in three main ways:

- A geographic concentration of economic activities and population in certain territorial units and in urban centers that tend to become megalopolises.
- The centralization in these territorial units of the institutional system responsible for decision making.
- Extreme disparities between the living conditions of the population located in these territorial units and those living elsewhere.

These characteristics accentuate environmental problems and produce disparities in how current models of growth address questions such as global warming and the loss of biodiversity.

In the present study, indicators of environmental problems are used to group countries with similar patterns of behavior in order to identify the main characteristics of the configuration of clusters and the role they play in South America.

All twelve South American countries considered in this study have signed and ratified various international treaties and conventions on climate change biodiversity and ecosystems, sustainable development, ocean protection and the management of waste and hazardous chemicals (see Note 2 and Appendix B).

The study's findings highlight the uneven progress made by these countries in addressing environmental

problems. In this respect, the 2023 Regional Conference on South-South Cooperation in Latin America and the Caribbean called for economic integration and partnerships for sustainable growth, with a view to fulfilling the United Nations 2030 Agenda.

The Peruvian Agency for International Cooperation (APCI) was created in 2002, the Ecuadorian Agency for International Cooperation (AGECI) in 2007 (in July 2010, its name was changed to that of the Technical Secretariat for International Cooperation), the Colombian Presidential Agency for Cooperation (APC) in 2011, the Mexican Agency for International Development Cooperation (AMEXCID) in 2011, and the Uruguayan Agency for International Cooperation (UCI) in 2011 (Rivero & Xalma, 2019). In the remaining LAC countries, development cooperation policies, programs and activities have been strengthened with the creation of new offices or departments within one or more government ministries (see Table 7).

Table 7. Latin America and the Caribbean: institutional framework for development cooperation

	Institution			
		Within the Ministry of Foreign Affairs		
	Cooperation agencies	Solelye within the Ministry of Foreign Affairs	Within the Ministry of Foreign Affairs and another ministry or department	Within another ministry or government department
Latin America	Brazil, Chile, Colombia[a], Ecuador[a], El Salvador[a], Mexico, Peru and Uruguay[a].	Argentina, Costa Rica, Honduras, Panama, Paraguay and Venezuela (Bolivarian Republic of).	Guatemala and Nicaragua.	Bolivia (Plurinational State of), Cuba.

In Colombia, Ecuador, El Salvador and Uruguay, in addition to the cooperation agency, there is a department (vice-ministry or directorate) for international cooperation within the Ministry of Foreign Affairs.

Source: Oviedo (2021).

In line with the findings obtained by other authors, there is currently a high level of environmental concern in South America. However, some countries have shown to be more concerned about climate change; these countries include Argentina, Chile and Brazil (Gallego-Álvarez et al., 2018). Chile is promoting the development of green hydrogen, while Brazil is a leader in renewable energy, with hydroelectric power. According to Darré et al. (2019) Uruguay's agricultural land increased by 138%, led by the soybean expansion (1,140,000 ha), making it one of the world's top six global exporters in the world. However, this land is not exempt from various environmental problems such as soil degradation, water pollution, deforestation, and loss of biodiversity.

The 2022 Environment Performance Index (EPI) shows that the highest scoring countries in the region are Chile and Suriname. Many countries with mid-range scores include Brazil, Colombia, Argentina, Paraguay, Bolivia, and Peru. At the other end of the Index, countries with low scores include Guyana and Uruguay, which have made little significant progress. There is a very high correlation between a country's wealth and its EPI score, so the environmental challenges vary according to a country's wealth and level of development of the countries. Ideas about environmental sustainability are therefore likely to reinforce already existing institutional and discursive settings (Crabb & Leroy, 2008); Alcaraz-Quiles et al., 2014; Olafsson et al., 2014; Boasson & Wettestad, 2016; Miranda et al., 2020).

CONCLUSIONS

This paper aims to evaluate the environmental sustainability performance of twelve South American countries, considering data published in 2019. Indicators of environmental sustainability highlight the evaluation of each country in this regard, and can be used to promote benchmarking. Multivariate statistical techniques are used to group the countries into five homogeneous clusters. The results obtained show that there are clear differences between these countries in terms of environmental sustainability, but that overall performance has improved in each case.

In relation to the production and secondary consumption of energy (PC1), Brazil, Argentina and Venezuela recorded progressive growth in indicators 10, 11, 12 and 13 (see Table 1). Brazil recorded the highest production capacity of renewable energy. By contrast, the production capacity of Guyana and Suriname has fallen in recent years due to their increased use of fossil fuels, although Suriname has received IDB assistance in energy reform projects (regarding institutional and regulatory reform, digitalization, sustainable infrastructure, energy access and renewable energies) to promote clean energy.

Ecuador, Peru and Brazil report the highest proportions of marine protected areas (Indicator 2), while neither Bolivia nor Paraguay have any such protected area. In absolute terms, Chile and Colombia have the largest Marine Protected Areas. The Nazca-Desventuradas Marine Park (Chile) is the largest single marine protected area in the Americas. According to Indicator 5 (Proportion of important places for marine biodiversity that constitute a protected area), Suriname, Ecuador, Brazil and Colombia each have a significant number of these locations, but Bolivia, Guyana and Paraguay have none.

Peru, Chile, Ecuador and Brazil score highly for total aquaculture production (Indicator 3), in contrast to Suriname, Uruguay and Paraguay. Chile, Brazil and Colombia each have a significant

proportion of protected areas in relation to marine areas (Indicator 3), while Bolivia and Paraguay have none. The lowest levels for intensity of fertilizer use (Indicator 17) are recorded for Bolivia, Guyana, Peru and Suriname, and the highest values, for Chile, Brazil, Uruguay and Ecuador.

Venezuela, Suriname, and Bolivia record the highest values, and Guyana and Uruguay, the lowest ones, for the proportion of important places for terrestrial diversity that constitute protected areas (Indicator 4). Paraguay, Guyana and Suriname score well for hydropower, solar, wind, geothermal, bioenergy, wave and tidal energy resources (Indicator 14), unlike Venezuela, Argentina and Bolivia. The leading countries for the proportion of terrestrial and marine protected areas (Indicator 7) are Venezuela, Bolivia and Brazil, while Argentina, Guyana and Chile score poorly in this respect.

The strongest average temperature variations (Indicator 1) are presented by Paraguay, Suriname, Brazil, Colombia, Venezuela and Ecuador, although in general the entire continent has experienced rising temperatures over the past fifteen years. Brazil, Argentina and Peru are the largest in terms of CAT (total surface area, including inland waters), while Suriname, Uruguay, Guyana and Ecuador are the lowest ranking in this regard.

Among the indicators regarding Factor 6, the highest values for total fisheries capture production (Indicator 15) are reported by Peru, Chile and Argentina, at levels that have not significantly increased during the last fifteen years. Bolivia reports the lowest values in this respect. With respect to air pollution, another indicator contributing to Factor 6, Peru, Bolivia, Suriname and Chile report the highest concentrations of fine particulate matter (Indicator 9), and Uruguay, the lowest.

In summary, the above findings reflect clear differences among these twelve South American countries in terms of their environmental sustainability performance, in some cases due to legal initiatives and practices (see Appendix A). In this regard, Chile can be considered a positive benchmark, having enacted new laws on climate change, having created a new, powerful public agency, SBAP, to protect biodiversity (finally established in June 2023, after 13 years' preparation), and having established the National System of Protected Areas, with severe sanctions for non-compliance.

Although predominantly descriptive, this analysis of environmental sustainability performance in twelve South American countries makes a real contribution to our understanding by revealing how and why some countries differ in this respect, and by highlighting the changes needed to enhance performance. In any geographic region

with commonalities such as those we describe, it is important to identify and characterize top-performing countries in order to create benchmarks on which others may judge their results.

Among the countries considered, Chile has most improved its environmental sustainability practices, for example by creating a significant marine protected area, thus obtaining competitive and comparative advantages for the development of sustainable aquaculture. Moreover, Chile is a signatory to international agreements against climate change and is making great efforts to achieve carbon neutrality.

The present research also identifies possible advances in theoretical concepts based on the environmental sustainability indicators analyzed, providing valuable empirical information. This is especially important as very few previous studies have adopted such a comparative-international perspective towards the South American region.

Our journey towards sustainability is a process based on a new environmental paradigm, which must guide us towards the changes needed in how resources are managed, in the economic criteria applied, in prevailing values and in the ecological and social practices developed. To be successful in this endeavor, we must alleviate the current deterioration of the global environment and adopt policies in line with the real possibilities of the natural world.

NOTES

Note 1. A Euclidean distance represents the space between two points, measured as a line segment.

Note 2. These treaties and agreements include the Basel Convention, the Stockholm Convention, the Rotterdam Convention, the Minamata Convention, the Vienna Ozone Convention, the Convention on Biological Diversity, the Sustainable Development Goals and the Convention on International Trade in Endangered Species (CITES).

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DECLARATION OF CONFLICTS OF INTEREST

Authors declare no conflict of interest.

AUTHORS' CONTRIBUTIONS

Conceptualization: Paola Marcela Hermosa Del Vasto; Rui Cunha Marques. **Software:** Juan Luis Peñaloza; Paola Marcela Hermosa del Vasto. **Validation:** Juan Luis Peñaloza. **Formal Analysis:** Juan Luis Peñaloza. **Data Curation:** Juan Luis Peñaloza. **Writing - Preparation of the Original Draft:** Paola Marcela Hermosa Del Vasto. **Writing-Review and Editing:** Paola Marcela Hermosa Del Vasto; Rui Cunha Marques. **Visualization:** Juan Luis Peñaloza. **Supervision: Rui** Cunha Marques. **Project Management:** Paola Marcela Hermosa Del Vasto. **All authors have read and accepted the published version of the manuscript.**

Appendix A. South America: Environmental Sustainability Framework Laws

Country	Legislation	Year	Name	Objective
Argentina	Law 27592 or Yolanda	2020	Comprehensive Environmental Training Law for civil servants.	Guarantee comprehensive environmental training, with a sustainable development perspective and with special emphasis on climate change, for public servants.
	Law 27621	2021	Citizenship training.	It proposes the incorporation of environmental contents in the school curriculum and establishes, among other issues, the right to education on this issue as a national public policy.
	Law 25675	2002	General Environmental Law.	Establishes the minimum requirements for the achievement of a sustainable and adequate management of the environment, the preservation and protection of biological diversity and the implementation of sustainable development in Argentina.
Bolivia	Law 1171	2019	Law on the Rational Use and Management of Fires.	Define the guidelines for the policy of integrated fire management in the national territory, establish the regime of administrative sanctions for unauthorized burning and determine an exceptional period of regularization in the payment of debts and fines for unauthorized burning.
	Law 71	2010	Mother Earth Rights Law.	Recognize the rights of Mother Earth, as well as the obligations and duties of the Plurinational State and society to guarantee respect for these rights.
	Law 1333	1992	Environmental Law.	The purpose of this law is the protection and conservation of the environment and natural resources, regulating the actions of man in relation to nature and promoting sustainable development in order to improve the quality of life of the population.
Brazil	Decree 11075	2022	Law decree to regulate the carbon credits market in the country.	Establishes the procedures for the preparation of Sectoral Climate Change Mitigation Plans and establishes the National System for the Reduction of Greenhouse Gas Emissions - Sinare.
	Law 13123	2015	Biodiversity Access Law.	Regulates access to components of the genetic heritage, the protection of and access to related traditional knowledge and the fair and equitable sharing of benefits arising from the conservation and sustainable use of biodiversity.
	Law 9605	1998	Environmental Crimes Act.	It regulates as active subjects of crime any natural person who carries out conducts qualified as crimes under this law, including administrators and legal persons and officials not only by direct action but also by omission.
	Law 6938	1981	National Environmental Law.	The preservation, improvement and recovery of the environmental quality favorable to life, with the objective of guaranteeing, in the country, the conditions for socioeconomic development, the interests of national security and the protection of the dignity of human life.

Continuation Appendix A

Country	Legislation	Year	Name	Objective
Chile	Law 21562 (bill approved by the House July 18, 2023)	2023	Amends Law 19300 on general bases of the environment.	Establish restrictions on the evaluation of projects in areas declared latent or saturated.
	Law 21455	2021	Chile's climate change framework.	Establishes Chile's roadmap towards carbon neutrality by 2050. To face the challenges posed by climate change, moving towards a development low in greenhouse gas emissions and other climate forcing factors, until reaching and maintaining greenhouse gas emissions neutrality by 2050.
	Resolution 79	2021	Regulation on the constitution and operation of the governance implemented within the framework of the water development and sustainability policy for the Valparaíso region.	To execute the Water Policy, the implementation of a "Governance" is considered as a goal to be achieved within the "Governance and Water Management" pillar, a necessary instance that allows for the follow-up and monitoring of the different actions resulting from it.
	Law (SBAP bill passed by the House on July 18, 2023)	2023	Biodiversity and Protected Areas Service Project (SBAP).	Confront the serious crisis of biodiversity loss and climate change that is affecting Chile and the entire world through the creation of a public, autonomous, decentralized service, with robust financing, 100% dedicated to the protection of Chile's natural heritage.
Colombia	Law 11	2021	Crimes against natural resources and the environment.	To replace Title XI, Articles 328 to 339 of Book II, Special Part of Crimes in General of Law 599 of 2000.
	Law 1977	2019	Drinking water and basic sanitation.	Whereby Law 1176 of 2007 is partially amended with respect to the Drinking Water and Basic Sanitation sector".
	Law 1964	2019	Promoting the use of electric vehicles.	Generate schemes to promote the use of electric and zero-emission vehicles, in order to contribute to sustainable mobility and the reduction of polluting emissions and greenhouse gases.
	Law 99	1993	General Environmental Law of Colombia.	Ensure that the occupation models of the Land Management Plans incorporate environmental sustainability and territorial resilience criteria.
Ecuador	Executive Order 59	2021	Establishing the Ministry of the Environment, Water and Ecological Transition.	Declares sustainable development a national priority and mandates the development of incentives for the protection of nature and ecosystems.
	Organic Environmental Code (COA)	2018	Conservation of natural areas and wildlife to climate change, and marine-coastal protection.	Responsibly regulate and manage projects or proposals for anthropic activities so that they do not threaten natural ecosystems.
	Law 37	1999	Environmental Management Law	Establishes the principles and guidelines of environmental policy; determines the obligations, responsibilities, levels of participation of the public and private sectors in environmental management and establishes the permissible limits, controls and sanctions in this area.
Guyana	Parliamentary Resolution No. 45 - National Development Plan about Low Carbon Development Strategy	2022	The new Low Carbon Development Strategy 2030	It will create a new-low-carbon economy in Guyana by establishing incentives which value the world's ecosystem services, and promoting these as an essential component of a new model of global development with sustainability at its core.
	Natural Resource Fund Act 2021 (Act No. 19 of 2021).	2021	Environmental, climate change and sustainable development rights.	Establishes the Natural Resource Fund to manage the natural resources of Guyana for the present and future benefit of the people and the sustainable development of the country.
	NPAP (National Biodiversity Strategy and Action Plan)	2015	National Biodiversity Strategy and Action Plan (2012-2020).	To promote and achieve the conservation of Guyana's biodiversity, to use its components in a sustainable way, and to encourage the fair and equitable sharing of benefits arising out of the use of Guyana's biodiversity".
	Act 11	1996. It was amended in 2005	Environmental Protection Act.	It provides for the management, conservation, protection and improvement of the environment, the prevention or control of pollution, the assessment of the impact of economic development on the environment, the sustainable use of natural resources and other related matters in Guyana.

Continuation Appendix A

Country	Legislation	Year	Name	Objective
Paraguay	Decree 3581	2020	Create the SDG Paraguay 2030 Commission.	To create a new inter-institutional commission called "Comisión ODS Paraguay 2030", for the fulfillment of the international commitments adopted by Paraguay within the framework of the 2030 Agenda for Sustainable Development.
	Law 1561	2000	Law that creates the National Environmental System, the National Environmental Council and the Environmental Secretariat.	To create and regulate the functioning of the bodies responsible for the elaboration, standardization, coordination, execution and supervision of national environmental policy and management in Paraguay. At the same time, it develops issues of participation in plans and policies, and in environmental education.
	Law 716	1995	Law penalizes crimes against the environment.	o protect the environment and the quality of human life against those who order, execute or, by virtue of their powers, allow or authorize activities that threaten the balance of the ecosystem, the sustainability of natural resources and the quality of human life.
Peru	Law 31313	2021	Sustainable Urban Development Law.	Guide the development of cities and population centers to be sustainable, accessible, inclusive, competitive, fair, diverse and just
	Law 28611	1999	General Environmental Law.	General framework for the development and approval of environmental regulations, within the principles of sustainable development.
	Law 26821	1997	Organic Law for the sustainable use of natural resources.	Promote and regulate the sustainable use of natural resources, both renewable and non-renewable, establishing an adequate framework for the promotion of investment, seeking a dynamic balance between economic growth, the conservation of natural resources and the environment, and the integral development of the human person.
Suriname	National Biodiversity Action Plan	2013	National Biodiversity Action Plan.	It defines the main actions to promote greater knowledge and appreciation of our common goods and the ecosystem services they provide.
	National Biodiversity Action Strategy	2007	National Biodiversity Action Strategy.	Formulate policies, initiatives, regulations and procedures that, in a coordinated manner, promote greater knowledge of environmental goods and services and the conservation and protection of biodiversity.
	Nature Conservation Law and Hunting Law	1954 (1992); 1954	Nature Conservation Law and Hunting Law.	Regulates the establishment and management of nature reserves and other protected areas. Hunting law stipulates which species of wild animals may be hunted and during what period. There are four categories of wild animals, namely protected animals, game species, caged species and predominantly harmful species.
Uruguay	Draft Law	2023	Bill to penalize environmental crimes (approved by the Environmental Commission of the Senate).	Criminalize water, air and soil contamination by waste, hazardous substances or wastes, among others.
	Decree 362/022	2022	Modification of decree No. 135/021 Air quality.	Establishing air quality objectives to reduce risks to human health and ecosystems and setting maximum emission limits for both stationary and mobile sources.
	Law 17283	2000	Environmental Protection Act.	To regulate the aforementioned constitutional provision, establishing fundamental rights and duties in environmental matters and providing only for administrative sanctions for infringement of environmental protection norms.
Venezuela	Environmental Criminal Law (Official Gazette 39913)	2012	Venezuelan Environmental Criminal Law.	To classify as crimes those acts that violate the provisions related to the conservation, defense and improvement of the environment, and to establish the corresponding penal sanctions.
	Law 5833	2006	Organic Law of the Environment.	To establish the provisions and guiding principles for environmental management within the framework of sustainable development.
	Law on Hazardous Substances, Materials and Wastes (Official Gazette 5554)	2001	Hazardous Substances, Materials and Waste Law.	To regulate the generation, use, collection, storage, transportation, treatment and final disposal of hazardous substances, materials and wastes, as well as any other operation involving them in order to protect health and the environment.

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A New Perspective on Real Estate in Thailand in the Post-Epidemic Era: Multi-Criteria Decision Analysis

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Abstract: The objective of this study was to evaluate the impact of the pandemic on Thailand's real estate market and to propose recommendations for investors and other market participants on how to continue operating in the market. The primary research methods employed were analysis, forecasting, and abstraction. The impact of the global pandemic on Thailand and the country's economy, with a particular focus on the real estate sector, was evaluated. The changes observed in the real estate sector since the onset of the pandemic were presented, including a decline in activity due to travel restrictions, a correction of residential and commercial property prices, an increase in demand for suburban properties, and a shift towards online sales, among other notable developments.

Keywords: COVID-19, regional development, scenario analysis, investments, finances, Thailand.

JEL Classification: I15; F63; R58; R51; G01.

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Una nueva perspectiva del sector inmobiliario en Tailandia en la era posepidémica: análisis de decisiones con criterios múltiples

Resumen: El propósito del estudio fue evaluar el impacto de la pandemia en el mercado inmobiliario de Tailandia y elaborar recomendaciones para los inversores y otros participantes en el mercado para poder seguir operando en este. Los principales métodos de investigación utilizados son el análisis, la previsión y la abstracción. Se estimaron los efectos de la crisis a causa del COVID-19 en Tailandia y en la economía del país, así como en el sector inmobiliario en particular. Se mostraron los cambios observados en el sector inmobiliario desde el inicio de la pandemia, como la disminución de la actividad debido a las restricciones de viaje, la corrección de los precios de los inmuebles residenciales y comerciales, el aumento de la demanda de inmuebles suburbanos y el desplazamiento hacia las ventas en línea, entre otros.

Palabras clave: COVID-19, desarrollo regional, análisis de escenarios, inversiones, finanzas, Tailandia.

INTRODUCTION

The real estate sector plays a pivotal role in the advancement of a country, exerting a profound influence on its economic, social, and infrastructural growth. For instance, the construction, sale, and maintenance of real estate result in the creation of a considerable number of jobs and contribute to the growth of gross domestic product (GDP). Furthermore, real estate ownership can serve as a source of income through the rental or sale of real estate. Real estate development also often leads to the expansion and improvement of infrastructure in urban and regional areas. The construction of new residential complexes, commercial premises and infrastructure improves roads, communications, energy supply and other vital systems, which has a qualitative impact on social conditions.

In addition, real estate frequently serves as the foundation for financial transactions, including loans, mortgages, and investments. In other words, real estate is one of the most significant sectors that numerous scholars consider when analyzing a country's economic situation.

The global impact of the COVID-19 pandemic has been profound, affecting nearly all industries, businesses, and individuals across the globe. The real estate construction and rental sector is similarly affected. Consequently, it remains pertinent to assess the state of the industry and provide guidance on the activities of companies within it. This study addresses these concerns. In particular, Thailand was the focus of attention, given the country's high dependence on foreign tourists and the emergence of trends such as population decline, which raise concerns about the long-term sustainability of the market in Thailand.

The country's path to economic recovery and development in the context of the COVID-19 crisis was studied by Benyaapikul (2021). The scientist noted that the country's development methods involved innovative development, a significant role of start-ups, and, as a result, frequent problems with a shortage of qualified personnel. Additionally,

challenges were encountered in the field of education, which proved unable to educate the requisite number of workers in the allotted timeframe. Sampantamit et al. (2020) conducted a study on the country's environmental sustainability. The researchers highlighted the rapid development of the country in recent years, while also noting the emergence of problems in the context of the external environment. As a result, there is an urgent need to develop and implement effective management strategies to address these environmental issues, which also applies to the construction industry.

The impact of international labor migration on regional economic growth in Thailand has been studied by Tipayalai (2020), who points to some existing changes in migration patterns. The study suggests that Thailand should prioritize attracting highly skilled foreign workers by offering flexible entry rules, tax incentives and business opportunities, as well as new additional investments in infrastructure, research support and research institutes. The need for new staff is also evident in the construction industry. Phorncharoen (2020), in turn, assessed the impact of market orientation, as well as the development of innovation and training on the real estate market. She described the impact of these variables on the development of the real estate market, and what exactly it is. However, the researcher did not formulate any business advice for companies or government policy in this area. Rattanaprichavej (2021) examined how Thai real estate agencies have coped with challenging situations such as the COVID-19 pandemic. The study assessed the crisis management strategies employed by these agencies, with a particular focus on the unique characteristics of the Thai real estate industry, which is highly dependent on foreign demand.

The aim of this study is to assess the impact of the pandemic on the Thai real estate market and in particular on its investors and companies. This will allow for more effective decision-making in the face of a crisis in such a market, as well as a more effective response in the future in the event of a new similar situation.

MATERIALS AND METHODS

This paper describes a method called Multi-Criteria Analysis, which is a decision-making methodology designed to help managers evaluate and choose among multiple alternatives or options based on multiple criteria or objectives. In essence, it consists of several components, namely, selecting alternatives, selecting the criteria against which these options are evaluated, assigning a score to each option, aggregating the scores, and formulating a decision based on the analysis. The article details its features and shows how it can be used by real estate companies in Thailand.

A separate statistical database was used in the study. Thus, the study used data from the Numbeo website to analyse real estate price data in selected cities of Thailand, namely Chiang Mai, Bangkok, Samut Prakan, Udon Thani and Nonthaburi (Numbeo, 2023). Information from the Trading Economics website was also used to analyze the number of people living in Thailand and the trends observed in this area (Trading Economics, 2023). Inflation data was analyzed from the World Data website, which allowed us to see certain economic trends in the country over a fairly significant period of time (World Data, 2023). Information from certain sources of global organizations, namely the World Bank, was also used to assess the current economic situation of the country, along with the inflation index (World Bank, 2023). All calculations were performed in Microsoft Excel.

The approach used in the study was systematic. It allowed to evaluate the factors that influenced the development of the real estate market during the COVID-19 crisis, taking into account their development in the framework of interaction. This made it possible to better understand their nature and role in terms of their impact on the real estate market, and therefore to more accurately select the factors that have a real impact on the object of study. The main research method was analysis. It made it possible to use the available quantitative and qualitative data to draw important conclusions about the development of the real estate market in Thailand and its future trends. The historical method, in turn, allowed for an assessment of the phenomenon in question in the past, in retrospect, which made it possible to better understand the real reasons for the existence of certain phenomena today, and therefore to better analyze them. In addition, forecasting was used to assess future trends in the country's real estate market. Abstraction also helped in the selection of the main influencing factors, as it allowed the impact of each of them to be assessed individually and those that did not have sufficient influence on the real estate market to be rejected. Research methods related to statistical analysis of data were also used; the graphical method was used to display relevant data that characterized the state of real estate development in Thailand in one way or another. Statistical methods such as historical analysis, forecasting, and the graphical method were used to draw conclusions based on large data sets.

RESULTS

The global impact of the COVID-19 crisis on the property market has been comparable to that observed in other sectors. The market has undergone significant changes in the few years since the start of the pandemic. For instance, during the initial phase of the pandemic, there was a noticeable decline in real estate market activity due to travel restrictions and uncer-

tainty about future prospects; many regions observed a slight correction in residential and commercial property prices due to reduced demand and economic instability. Additionally, the increased use of remote work led to an increase in demand for property in suburbs and remote regions. Furthermore, several obstacles were encountered in the process of securing financing for the purchase. These included more stringent lending criteria, a greater challenge in obtaining mortgage loans, more exacting credit score requirements, higher down payment requirements, and a reduction in loan approval rates. Investors in this sector have begun to pay more attention to market stability and opportunities for long-term investment. During the COVID-19 crisis, the market was dynamic, and the situation on it changed frequently and rapidly, which affected the state of the economy in general and people in particular, who were largely affected by changes in housing prices.

The impact of the COVID-19 pandemic on the Thai real estate market as a whole was also significant and noticiable. This was due to a decrease in demand from foreign buyers, as Thailand has always been a popular destination for foreign investors and property buyers. For instance, the demand from foreign investors dropped by 40% in 2020 compared to 2019 (Jiang, 2021). However, the pandemic has led to restrictions on international travel and a decline in the interest of investors from other countries. The hotel industry has also been affected by the decline in tourist arrivals, with occupancy rates falling by 75% at the peak of the pandemic (Khuntaweethep & Koowattanatianchai, 2022). During the pandemic, the demand for property types changed, which is generally a common trend across all countries. There was also a noticeable decline in property prices by approximately 15%, as well as a shift to online sales, which increased by 30% (Jiang, 2021). The latter was driven by new requirements for user security and the need to increase their own competitive advantage. Some components of this impact are similar to those in the rest of the world, while others are not, but they all change the rules for companies operating in the local Thai market. They should be taken into account when making management decisions and operating in the market in general. Thus, the approach of companies to their decision-making process in the context of market activities should also change. As part of this work, it should be proposed to use the method of multi-criteria decision analysis, which has already been mentioned in detail above.

It is worth considering what changes have occurred in the real estate market in Thailand since the beginning of the pandemic, and certain data that may be

related to the state of this market. For example, the population of the country correlates with the state of the market and its prices, as shown in Figure 1.

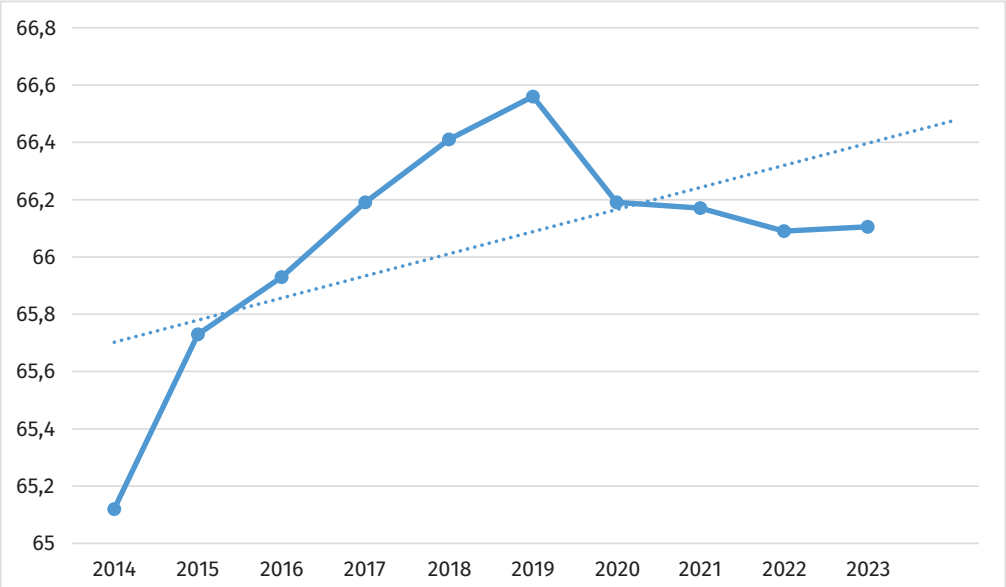

Figure 1. Population change in Thailand during 2014-2023, billion people

Source: compiled by the authors based on data from Trading Economics (2023).

As shown in Figure 1, the population of Thailand is gradually increasing. Such a trend is positive for the development of the country's real estate market, given the growing demand for various buildings and structures. However, some problems began in 2020 (a gradual decline in the number of the population is observed), which is probably related to the crisis of COVID-19 and the first manifestations of trends regarding the ageing of the nation as a whole (Krulicky & Hromada, 2022; Marttunen et al., 2017; Zlaugotne et al., 2020). Therefore, given the changes in recent years and their likely continuation, there may be some concern about the state of the market. This is mainly due to the fact that the larger the population of the region, the more actively it will spend money on purchasing real estate. It is also worth considering certain trends related to economic well-being, which are shown in Figure 2.

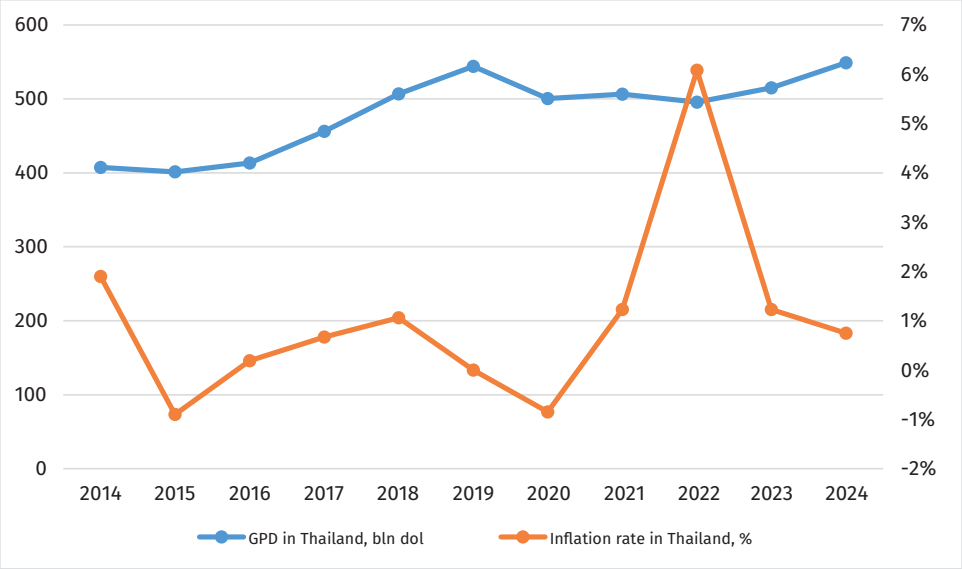

Figure 2. Inflation and GDP in Thailand from 2014 to 2024

Source: compiled by the authors based on data from World Bank (2023) and World Data (2023).

As can be seen from Figure 2, the inflation rate in the country remains moderate and only in 2022, due to global destabilization associated with the beginning of a full-scale invasion of Russia into Ukraine, it rose to a value of 6%. Russia's attack has had far-reaching economic consequences around the world, contributing to financial market instability, supply chains disruptions, and higher energy prices. These effects have compounded the existing challenges in Thailand's economy. Negative indicators, however, can be seen in terms of GDP, which indicates a decrease in the rate of economic growth and existing problems with the creation of new types of products in the country, the possibilities of production of products and services (Kupriyanov, 2022). This also suggests that there are difficulties in the real estate market in the country, as its condition directly depends on the standard of living of the population. Thailand's economy has been significantly affected by the ongoing conflict between Israel and Hamas, especially in terms of exports to Israel. Additionally, the disruption of shipping routes through the Red Sea has resulted in higher transportation costs. In spite of these obstacles, the Thai government has taken action to lessen the effects, including working with shipping companies to modify freight rates and enacting gradual increases to help exporters better control costs. The situation in the real estate market can be understood in more detail by evaluating the data in Table 1.

Table 1. Data on the characteristics of individual components of the real estate market in Thailand in 2023

Indicator	Chiang Mai	Bangkok	Samutprakan	Udonthani	Nonthaburi
Flat (1 room) in the city center, Thai baht (THB)	13000	25250	9333.33	6250	7750
Flat (1 room) outside the center, THB	8000	11868.31	5500	3687.5	9000
Flat (3 rooms) in the city center, THB	27000	58679.49	40000	15433.33	22500
Flat (3 rooms) near the center, THB	16416.67	30440.32	15000	8437.5	28333.33
Price per square meter buy a flat in the city center, THB	63250	199461.54	x	49500	97500
Price per square meter buy a flat in the center, THB	40750	89471.63	96875.19	21850	100000
Average monthly net salary (after tax), THB	18777.78	23276.53	21333.33	13500	26666.67
Interest rate on a mortgage loan in percent (%), annual, for 20 years with a fixed rate	4.88	5.73	x	7.94	3

Source: compiled by the authors based on data from Numbeo (2023).

As shown in Table 1, rental and purchase prices and mortgage rates can vary widely across the country. Companies that built or invest in real estate should also pay particular attention to this information, as it can directly affect their future cash flows. Various indicators that characterize the market should be considered separately, such as the rental price of different types of flats, including one-bedroom and three-bedroom flats, as well as the price per square meter depending on the location. It should also be noted that when making management decisions, it is not worth paying attention to regional averages, as they can vary significantly depending on where a particular property is planned to be built. For this purpose, it is worth conducting an independent assessment by experts hired by the company. It is also worth noting that when companies conduct their own assessments, they should identify a much larger number of criteria (both in the case of construction and investment processes). These may include the geographic location of the property, trends in local markets, the financial performance of each project, etc.

When operating in the real estate market in Thailand, companies can use the method of multi-criteria decision analysis. Its essence lies in the ability to assess the formation of decisions in various areas by evaluating scenarios and relevant criteria that will differ in each of the alternatives. A more detailed explanation of the multi-criteria decision analysis model can be seen in Figure 3.

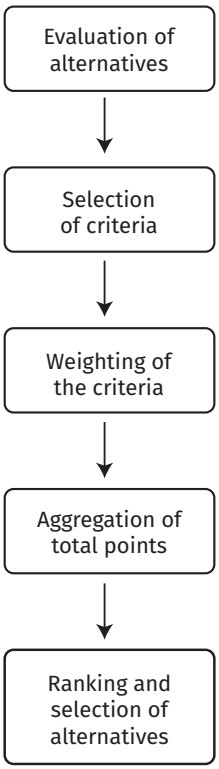

Figure 3. Description of the functioning of the multi-criteria decision analysis model

Source: compiled by the authors.

As it can be seen from Figure 3, multi-criteria decision analysis can be divided into 5 main components. Thus, the evaluation process involves defining a set of alternatives or options to be assessed. These alternatives can be potential solutions to a problem, projects, products, or any other options that require a decision. The next step is to establish a list of criteria for selecting the alternatives. The criteria are factors or attributes that are relevant to the decision-making process and will be used to evaluate and compare the alternatives; they can also be qualitative or quantitative and should be carefully chosen to ensure that they are both representative of the research objectives and actually help in the decision-making process. Once the criteria are identified, the decision maker assigns weights to each criterion to indicate its relative importance or priority. These are based on expert judgement, so they may vary depending on who is doing the work. Most often, these weights are expressed as percentages. Each alternative from the criteria is then assigned a score: by multiplying these values, an overall assessment of a particular alternative (utility score) is formed. This overall score reflects the overall effectiveness or suitability of each alternative. The alternatives are then ranked based on their overall scores, with the highest scoring alternative being the preferred or recommended choice (Boanada-Fuchs & Fuchs, 2022; Jamwal et al., 2021). For better scoring and weighting, it is advisable to solicit the opinions of many experts and use the average of all of them to arrive at the most effective scores. In summary, multi-criteria decision analysis can provide a systematic and transparent framework for making complex decisions, allowing decision makers to consider multiple and qualitative criteria and their relative importance in formulating decisions, making them more informed and balanced.

Thus, a similar practice can be applied to Thailand and the real estate market. It provides a structured and systematic approach to decision-making, taking into account multiple criteria and their relative importance: this allows for more efficient decision-making than other methods, such as standard investment decision-making methods by discounting projected cash flows. This is because multi-criteria decision analysis allows you to evaluate not only financial or economic factors, but also other factors, even qualitative ones. For example, factors such as the rental price of flats of different sizes and the price per square meter were mentioned above: they should, of course, also be evaluated, but other qualities should also play a role, such as an assessment of the region in which the building is located, the likelihood of disasters in the area, etc. This can greatly assist in the acceptance of individual investment projects. This method is also flexible and adaptable to different contexts and scenarios, and can be applied in virtually any environment, even under complete uncertainty. Multi-criteria decision analysis can also be used for scenario analysis, i.e. to reduce the level of uncertainty in the market that arises during and after the pandemic. All the characteristics of this type of decision analysis described above can help overcome the challenges posed by the COVID-19 pandemic and make informed investment decisions in a volatile environment.

DISCUSSION

An investigation of Thailand's demographic dynamics provides significant insights into economic growth plans. Scientist Pattarakijkusol (2021) emphasizes the significant impact of population changes on economic trajectories. This approach underlines the combined effect of labor productivity and dependency ratios on economic outcomes. In particular, the study's findings illustrate the important and often surprising role that the dependency ratios of young and old play in economic success. This understanding is critical for developing real estate strategies in Thailand, where the balance of workforce availability and population pressures must influence investment decisions and policy formulation. As stated in the paper above, in the current environment, the country's population is declining significantly, which could have negative long-term social and economic consequences (Abdullah et al., 2021; Bas, 2022; Salman et al., 2019). They described the positive impact of institutional development on economic growth. They also pointed out the importance of ensuring that local institutions are in place to balance economic growth and environmental concerns, especially in the context of emerging economies in East Asia, such as Thailand. While this component is indeed important for the development of the country as a whole, and real estate in particular, scholars should also pay

attention to other important components when formulating any advice on long-term economic growth, including the overall macroeconomic situation, political and social stability, etc.

Real estate construction has an important role in achieving economic and social sustainability, according to a study done by Strömbäck and Tärnell (2022). The researchers gathered information from numerous real estate enterprises in Sweden to better understand how these entities contribute to social sustainability and profitability. Their findings show that social sustainability is becoming more essential in the real estate industry, driven by the need for businesses to meet societal standards while also improving their market position. The study emphasizes that larger corporations are more likely to participate in social sustainability projects due to increased resources and demand. Furthermore, public-private partnerships are highlighted as an important strategy for dealing with market crises like the COVID-19 epidemic. These partnerships can help to implement sustainable practices and boost economic resilience. The authors also suggest that real estate development be closely linked to urban planning, with an emphasis on regulatory measures and the establishment of sustainable and efficient financial objectives.

Balemi et al. (2021) studied the impact of COVID-19 on real estate markets. They noted that it was multifaceted and could vary across sectors. The long-term consequences remained uncertain and depended on many factors, which complicated the scientists' analysis. The researchers noted that during the crisis, there was a shift to remote work, which led to a decrease in demand for office space. They predicted that coworking and shared offices could replace traditional office space, which would affect rental prices and profits for investors and companies. The pandemic has also accelerated the shift to online shopping, affecting traditional retail facilities. Since the crisis has led to changes in supply chains, they pointed to changes in the development of stores, including their transition to online format, the creation of their own pages on the network, etc. The researchers also wrote about the relatively minor impact on the real estate market but described significant problems with the ability of the population to repay mortgages. Similar negative effects were described in the paper above; in particular, the pandemic led to significant shocks at the outbreak, including in the real estate market, significant changes in real estate prices, etc. This led to market turbulence and negative effects on the social and economic spheres of the country. A study of the impact of the COVID-19 crisis as a clear example was conducted by Toro et al. (2021). The researchers described the impact of the pandemic on the real estate market in the Naples metropolitan area (Italy) and drew relevant conclusions in this regard. They noted that the COVID-19 pandemic has

caused significant changes in real estate trends: demand for residential property has shifted towards larger homes with better natural light and amenities. In addition, the incorporation of technology into properties and their sales processes has become much more widespread. A significant number of sellers plan to use it even after the pandemic ends. This was due, among other things, to the spread of sustainable development narratives and the strengthening of the government's role in this context in terms of monitoring the environmental and social situation in the country. Due to the growing demand for certain types of buildings (although the demand for them has fallen overall), trends in the restoration of old facades and the adaptation of existing facilities, even relatively old ones that have been vacant for a long time, have become more common. As mentioned above, such changes have a significant impact on the market structure and may affect long-term development trends. Therefore, they should be assessed in detail when formulating investment strategies in the market.

Yeh et al. (2023) posit that multi-criteria decision-making (MCDM) models are already being utilized by countries such as Vietnam, Burma, and Cambodia to assess real estate investment projects. In making judgements about real estate investments in these developing Southeast Asian markets, decision-makers can consider a multitude of elements, including financial, environmental, and social aspects, due to the implementation of these MCDM models. The study's conclusions support the idea that MCDM is a useful method for assessing real estate ventures in Southeast Asian nations that are underrepresented.

As Chaiwuttisaka (2023) notes, the use of multi-criteria decision-making processes in Thailand's stock market serves to illustrate the country's advanced approach to investment strategy. The study conducted by the author employs the Analytic Hierarchy Process and the Technique for Order of Preference by Similarity to Ideal Solution to efficiently rank investment choices in the Energy and Utilities sectors of the SET50 index. This methodology not only allows for the comparative significance of many financial and technological standards to be measured, but it also aligns with the global trend of increasingly data-driven and analytical investment decision-making procedures. The integration of these approaches enables stock market stakeholders in Thailand to negotiate the intricacies of investment decisions with greater precision, which may ultimately lead to more robust investment outcomes. The real estate industry, among others, might benefit from this use of multi-criteria decision-making tools, as it requires a comparable level of analytical rigor to make the best possible investment decisions in the face of constantly changing market conditions.

In light of the aforementioned information, it is possible to offer certain recommendations for companies when utilizing the criterion analysis method. For example, it is prudent to adopt a comprehensive approach to data collection and the formulation of conclusions or judgements, as this can have a profound impact on the model, particularly in instances where numerical values are unavailable. It is recommended that all alternative scenarios be subjected to the collection of such information, with any necessary adjustments made. In addition, it is of the utmost importance to exercise caution when selecting criteria, especially those that are not directly related to the feasibility of the project. It is also essential to consider the importance of developing a sustainable business model that will be able to withstand a recurrence of a crisis such as the global pandemic of 2020. These considerations can significantly increase the performance of enterprises within the Thai internal real estate market.

CONCLUSIONS

The COVID-19 pandemic has had a significant impact on the Thai property market. Over the past few years, a number of notable shifts have been observed in the market, which are related to broader economic trends. These include a decline in population, a reduction in foreign investment, and a deceleration in GDP growth. Consequently, demographic trends, economic indicators, and disparate property prices within the country present a matter of concern that necessitates further investigation by academic researchers and by companies in their own decision-making processes. The variation in property prices, mortgage rates and rental rates that has been shown in the study by city in Thailand also highlights the importance of assessing regional specifics. It is recommended that companies conduct detailed assessments that take into account geographical nuances, local market trends and financial performance.

In this new environment, multi-criteria decision analysis is becoming a very effective tool. Its structure allows for a systematic evaluation of alternative solutions, including numerous criteria and their relative importance. By considering not only financial and economic factors, but also qualitative parameters such as location and disaster resistance, multi-criteria decision analysis enables decision makers to make informed and balanced choices. Furthermore, the adaptability of the method to different contexts and scenarios, including uncertainty, positions it as a robust strategy for addressing the challenges posed by the pandemic and its aftermath. Therefore, by using this methodology, companies operating in the Thai real estate sector can improve their decision-making processes, which will ultimately contribute to the sustainability and growth of the sector. Further research is needed to assess the state of the real estate market in other countries,

as well as the performance of their companies during and in the aftermath of the pandemic. It is also important to identify strategies for leveraging this experience in Thailand.

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DECLARATION OF CONFLICTS OF INTEREST

The authors of this article declare that they have no conflicts of interest.

AUTHOR`S CONTRIBUTION

Fan Zhai was responsible for conceptualizing the research, visualizing the data, and drafting the original manuscript.

Ahmad Yahya Dawod was responsible for the curation and analysis of data, as well as the management of resources.

Somsak Chanaim developed the methodology, administered the project, and validated the results.

Naret Suyaroj supervised the process and conducted the investigations.

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Comparative Analysis of Stochastic Frontier Efficiency in Payroll and Accommodation Tax Collection in Mexico (2010-2020)

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Abstract: The objective of this study is to assess the effectiveness of payroll tax (ISN, by its acronym in Spanish) and accommodation tax (ISH, by its acronym in Spanish) collection at the state level in Mexico from 2010 to 2020. Using a panel of data from all 32 states in Mexico, we employ the Stochastic Frontier (SF) approach with a semi-normal distribution of random errors. States with high efficiency in ISN do not always align with those with the highest GDP or lowest intergovernmental transfers. Our analysis suggests that states with beachfront locations and tourist attractions tend to exhibit greater efficiency in ISH collection. These findings provide valuable insights for policymakers, offering a solid foundation for informed decision-making to improve the fiscal landscape in Mexican federal entities.

Keywords: Federalism, tax efficiency, payroll tax (ISN), lodging tax (ISH), stochastic frontier (SF), Mexico.

JEL Classification: H21, H24; H71, H77, L83, L88.

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Análisis comparativo de la eficiencia de la frontera estocástica en la recaudación de impuestos sobre nómina y hospedaje en México (2010-2020)

Resumen

En este artículo se analiza la eficacia de la recaudación del impuesto sobre la nómina (ISN) y el impuesto sobre el alojamiento (ISH) a nivel estatal en México durante el periodo de 2010 a 2020. Utilizando un panel de datos de los 32 estados mexicanos, aplicamos el enfoque de frontera estocástica (SF) con una distribución seminormal de errores aleatorios. Los estados con alta eficiencia en la recaudación del ISN no siempre se corresponden con aquellos que tienen un PIB más alto o que reciben menores transferencias intergubernamentales. Nuestro análisis sugiere que los estados con destinos turísticos en la playa tienden a mostrar una mayor eficiencia en la recaudación del ISH. Estos resultados son fundamentales para los encargados de formular políticas, ya que proporcionan una base sólida para la toma de decisiones informadas con el fin de mejorar la situación fiscal en las entidades federativas de México.

Palabras clave: federalismo, eficiencia tributaria, impuesto sobre la nómina (ISN), impuesto sobre alojamiento (ISH), frontera estocástica (SF), México.

Clasificación JEL: H21, H24; H71, H77, L83, L88.

INTRODUCTION

The constrained levels of public revenue in developing countries have limited their governments' ability to conduct fair redistribution processes, provide quality public services, and promote economic growth. In Mexico, as in other Latin American countries, the main reasons for revenue fragility are linked to high levels of tax evasion and inherent administrative inefficiencies within the tax system.

Since 1980, the National Fiscal Coordination System (SNCF, by its acronym in Spanish) has regulated intergovernmental relations across the three levels of government in Mexico. Under this agreement, federative entities have relinquished most of their taxing powers, delegating the administration of broad-based taxes, such as income tax, VAT, and excise taxes, primarily to the federal government (Sobarzo, 2003). Despite this centralization, the inadequate collection of tax revenues by the federal government emphasizes the need to explore alternative measures to increase revenue and meet commitments made to the population.

The ultimate goal is to enhance the quality of public expenditure in the country by addressing the effectiveness of the collection of these specific taxes (Chávez & Hernández, 1996). This study focuses on the efficiency with which federative entities collect taxes during the period 2010-2020 in Mexico, with a particular emphasis on enhancing tax collection at the state level.

We use SF models for ISN and ISH to assess technical efficiency across 32 federal entities. ISN is examined due to its stable revenue generation, representing over 70 percent of local tax revenues. On the other hand, ISH is explored given Mexico's global tourism ranking. The legal framework for both taxes is established in the Fiscal Laws and Tax Codes of each federative entity, specifying the applicable annual rate in each fiscal year.

The literature review underscores the relevance of SF models in estimating tax collection inefficiencies.

The SF model has been widely used in international cases and has been implemented in different contexts in public finances to estimate the efficiency of tax collection. These estimates allow for a comparison of the efficiency of tax administrations across different states.

The key findings regarding the efficiency of ISN and ISH collection in different Mexican states are as follows: The efficiency of ISN collection varies significantly across states. Chiapas was identified as the most efficient in ISN collection, followed by Tabasco, Mexico City, Baja California Sur, and Tlaxcala. In contrast, the least efficient states included Durango, Jalisco, Sonora, Sinaloa, and Zacatecas. Notably, states with higher GDP on average do not necessarily exhibit higher efficiency, indicating that local economic conditions play a crucial role in tax collection outcomes. For ISH collection, Baja California Sur was found to be the most efficient, followed by Guerrero, Nayarit, Sinaloa, and Baja California. These states benefit from their tourist attractions, which contribute to a larger taxable base. Conversely, Tlaxcala was identified as the least efficient in ISH collection, followed by Mexico City, Durango, Zacatecas, and Hidalgo. The efficiency of both taxes is influenced by various factors, including local economic conditions, the composition of the workforce, the prevalence of informal employment, and the number of employees registered with the IMSS. For ISH, tourism-related factors such as GDP and employment rates in the tourism sector are critical. These findings highlight the disparities in tax collection efficiency among Mexican states and the importance of tailored approaches to enhance tax collection strategies at the local level.

The document is organized as follows: The first section provides an overview of the tax collection processes for payroll and lodging taxes in all 32 Mexican states from 2010 to 2020. The second section introduces the SF Model, along with examples of its use by international organizations to assess tax collection efficiency in various countries. This section also includes a review of relevant literature on tax collection in Mexico, both at state and municipal levels. The third section details the model and data used to analyze the collection efficiency of ISN and ISH taxes in Mexican states from 2010 to 2020 are presented. A discussion is presented in the subsequent section. The conclusions are in the fifth section.

OVERVIEW

Payroll Tax (ISN) from 2010 to 2020

ISN is collected by multiplying the monthly net salary of employees by the rate established in the Fiscal Code of the respective entity. Entities obligated to pay ISN are those making disbursements for compensated subordinate work. All 32 federal entities in Mexico

levy this tax. In 2022 Baja California imposed the lowest applicable rate (1%), while Chihuahua imposed the highest rate at 4% (Fernández, 2022). Revenue generated from ISN is stable and consistent compared to other state taxes (Castañeda & Pardinas, 2012). In 2019 ISN revenue was the primary source of state tax income, representing 70.7% of local taxes (CIEP, 2021).

Table 1 illustrates the evolution of ISN tax collection on average during the analyzed period (2010-2020). It shows an average growth rate of 12% in nominal terms. In 2014, the growth rate peaked at 21%, and the highest collection occurred in 2020 ($78,368,608,665). However, 2020 recorded the lowest growth rate at 40%, compared to the previous year.

Table 1. Average ISN revenue from 2010 to 2020

State	ISN Average (pesos)	GDP Average (constant pesos base 2013)
Aguascalientes	695,198,542.64	192,801.51
Baja California	1,963,600,652.27	505,809.31
Baja California Sur	438,847,578.64	130,977.32
Campeche	1,068,674,545.00	627,926.80
Chiapas	1,144,161,899.36	276,932.35
Chihuahua	2,525,535,615.09	503,428.23
Ciudad de México	19,279,063,328.55	2,820,444.20
Coahuila	1,670,542,404.36	558,690.16
Colima	296,622,201.73	96,134.04
Durango	315,953,400.00	190,879.73
Guanajuato	2,541,943,975.00	631,575.63
Guerrero	418,319,201.55	226,308.32
Hidalgo	789,703,924.82	246,209.29
Jalisco	3,066,976,158.64	1,085,525.63
Estado de Mexico	9,468,564,245.45	1,434,420.95
Michoacán	1,062,915,930.91	382,977.33
Morelos	466,378,766.55	187,293.20
Nayarit	255,970,893.00	110,477.14
Nuevo León	5,938,964,945.00	1,207,289.00
Oaxaca	774,527,050.91	247,000.16
Puebla	2,279,898,432.91	540,763.09
Quintana Roo	1,132,003,050.09	241,098.04
Queretaro	1,439,888,930.91	353,469.80
San Luis Potosí	1,105,482,254.09	325,565.51
Sinaloa	928,283,168.91	355,537.20
Sonora	1,189,529,514.45	531,829.65
Tabasco	1,375,400,432.36	522,186.91
Tamaulipas	2,317,140,487.82	482,990.47
Tlaxcala	320,272,676.18	93,188.28
Veracruz	2,573,518,176.73	771,528.61
Yucatán	990,343,264.73	231,439.38
Zacatecas	340,134,496.00	152,033.74

Source: Author's own compilation. INEGI (2022c), INEGI (2022e).

There are significant differences in the collection of ISN, with the rate being the most representative; however, there are also many variations in the designation of subjects and objects across different states (Platas, 2014).

Lodging Tax (ISH) from 2010 to 2020

ISH is a state tax levied on accommodation services provided in real estate within the Mexican Republic. Those liable for the tax are individuals or entities offering lodging services in exchange for payment. The basis for ISH collection is the amount paid by the tourist for each night of stay, multiplied by the applicable rate established by each entity (Pulido, 2015). In the Income Law of each State, it is specified that the payment rate ranges from 3% to 5% (Pulido, 2015). In 2022, the applicable

ISH rate varied between 2% and 4% in Baja California, Chiapas, Colima, and Yucatan (INDETEC, 2021).

Table 2 displays the evolution of ISH revenue on average in nominal terms during the period 2010–2020, which was much lower than that of ISN: an average annual increase of 0.09%. In 2021, its highest average annual growth rate was observed at 0.26% in nominal terms. It is worth mentioning that in 2020, a 40% decrease was reported. On average, the collection of the ISN exceeds that of the ISH: The annual ISH collection during the study period represents between 3 and 4% of the collection obtained by ISN.

Table 2. Average ISH Tax Collection from 2010 to 2020

State	ISH Average (pesos)	GDP Average (constant pesos base 2013)
Aguascalientes	12,263,860.09	192,801.51
Baja California	78,514,655.27	505,809.31
Baja California Sur	211,654,190.45	130,977.32
Campeche	11,577,193.45	627,926.80
Chiapas	18,054,501.73	276,932.35
Chihuahua	44,589,419.64	503,428.23
Ciudad de México	320,900,365.45	2,820,444.20
Coahuila	33,684,853.09	558,690.16
Colima	15,509,309.36	96,134.04
Durango	6,281,213.64	190,879.73
Guanajuato	45,885,674.73	631,575.63
Guerrero	98,233,562.55	226,308.32
Hidalgo	8,181,185.18	246,209.29
Jalisco	182,814,719.45	1,085,525.63
Estado de México	78,825,818.18	1,434,420.95
Michoacán	15,692,910.45	382,977.33
Morelos	17,093,205.64	187,293.20
Nayarit	114,749,642.27	110,477.14
Nuevo León	72,136,344.55	1,207,289.00
Oaxaca	39,561,428.09	247,000.16
Puebla	23,988,187.00	540,763.09
Quintana Roo	896,865,082.91	241,098.04
Queretaro	32,796,034.18	353,469.80
San Luis Potosí	25,338,223.55	325,565.51
Sinaloa	72,168,052.82	355,537.20
Sonora	31,269,686.18	531,829.65
Tabasco	15,100,471.55	522,186.91
Tamaulipas	20,552,430.55	482,990.47
Tlaxcala	2,012,464.55	93,188.28
Veracruz	44,501,115.45	771,528.61
Yucatán	33,289,776.91	231,439.38
Zacatecas	6,975,842.55	152,033.74

Source: Own compilation. INEGI (2022a), INEGI (2022d).

Currently, in the states that impose an ISH, the rate fluctuates between 3 and 5 percent (Santos & Martínez, 2012).

LITERATURE REVIEW

Aigner et al. (1977) developed a linear SF (Meta-Frontier Efficiency) model to estimate the production function potential of companies. Firstly, they estimated the maximum possible production considering technology and productive inputs. Subsequently, estimated maximum production was compared with the actual production to calculate technical inefficiencies. Battese and Coelli (1995) propose the following production function to estimate the level of technical of the company:

$$q_{it} = exp\,(\boldsymbol{x}_{it}\boldsymbol{\beta} + V_{it} - U_{it}) \qquad [1]$$

Where:

q_{it}= production of company at the *t*-th observation (t=1, 2, ..., *T*) for the *i*-th firm (i=1, 2, …, *N*)

x_{it}= input vector and other explanatory variables associated with the *i*-th firm at the *t*-th observation

$\boldsymbol{\beta}$= vector of unknown parameters to be estimated

V_{it} are $iid\ N\ (0, \sigma^2)$ random errors, independently distributed of the $U_{it}s$. $U_{it}s$ are nonnegative random variables associated with technical inefficiencies of production, which are assumed to be independently distributed. If U_{it} equals 0 the company is considered efficient; otherwise, it deviates from the SF due to inefficiency.

The SF has been widely applied internationally and implemented in various contexts within public finances. Considerable attention has been given to the Asian continent, particularly in studies conducted in India (Aigner et al., 1977), Battese and Coelli (1995), Jha et al. (2000), Garg et al. (2014), Karnik and Raju (2015), Mukherjee (2020), Agarwal and Malik (2022), Kawadia and Suryawanshi (2023)). Alfirman (2003) and Lewis (2017) studied provinces in Indonesia. Scholars from India and Indonesia agreed that the most efficient states are those with high per capita state GDP, a significant share of the secondary and tertiary sector in the economy, higher decentralized public spending (especially in social areas), and improved administrative capacity. In contrast, states with higher inefficiency are those with greater intergovernmental transfers, levels of debt and liabilities, as well as a significant share of the primary sector, informality, and corruption in the economy. It is noteworthy that Karnik and Raju (2015) are the only researchers highlighting specific taxes that significantly improved revenue collection in India: the first being the state sales tax, followed by the one applied to alcoholic beverages.

On the other hand, Fenochietto and Pessino (2013), Langford and Ohlenburg (2016), and Mawejje and Sebudde (2019) conducted studies for more than 85 countries in Africa, Asia, Europe, and Latin America. These studies coincide in finding that tax collection inefficiency increases with high inflation rates, high Gini coefficients, and the presence of corruption in economies. In contrast, fiscal efficiency increases with economic activity growth, per capita GDP, private sector credit, health expenditure, and subsidies. Thus, they suggest that European countries are more efficient in tax collection than Latin American countries. This result is natural as they agree that GDP and economic growth are significant determinants for improving revenue collection. Due to these factors, Europe seems to be more dynamic in tax collection than Latin America.

In the case of Mexico, the SF has been used in various studies in the field of state and municipal public finances, enabling researchers to measure and compare performance across different federal entities in terms of public finance collection. Aguilar (2009) conducted the first SF estimation at the municipal level in Mexico using property tax collection data from the 300 most important municipalities in the country. For this, a fiscal collection function was established for municipalities depending on GDP, the percentage of industrial GDP, total and urban population, and the Gini index. The municipalities that exhibited the greatest tax collection inefficiency in property tax were Tijuana, Chihuahua, Acapulco, Pachuca, Tula, and various municipalities in Chiapas. Tax inefficiency was also notable in municipalities in the State of Mexico such as Atizapán, Tlalnepantla, and Cuautitlán Izcalli.

A year later, Aguilar (2010) conducted another study, this time to analyze property tax collection in Mexico City and 25 municipalities in three metropolitan areas (State of Mexico, Monterrey, and Guadalajara). The municipalities of Monterrey and Guadalajara were the most efficient collectors, while the State of Mexico ranked at the other end, similar to the delegations of Mexico City.

Ramírez and Erquizio (2011) estimated the SF to determine the efficiency of own income tax collection for the 32 Mexican federal entities, using data on employment, the economic participation rate, per capita GDP, population, inflation rate, and informal employment rate. The results showed that Mexico City was the federal entity with the highest fiscal effort, followed by Baja California Sur.

Puente and Rodríguez (2011) used the SF to estimate the tax efficiency of ISN and ISH during the period from 1993 to 2008. The tax collection function included variables such as GDP, population, tax collection, hotel occupancy rate, and the number of employees registered with the IMSS. The results obtained reveal that, on average, ISN significantly contributed 64% to total collection in the 32 analyzed federal entities. On the other hand, ISH represented 28% of income specifically in Baja California sur, Hidalgo, and Chiapas.

Castañeda and Pardinas (2012) conducted a study that included several state and municipal taxes simultaneously. Firstly, they analyzed the collection of ISN using per capita GDP and the economically active population. Subsequently, they estimated property tax collection using municipal per capita GDP and the economic dependence of the population. Then, they used industrial GDP, the institutional quality index of justice, whether the governor is from the same party as the president, the informality rate, the corruption and good governance index, and the transparency index. The results

showed that political factors influenced tax collection significantly. The authors recommend improving transparency and the quality of governments to increase the taxable base.

The ISN collection effort in Mexican states was estimated by Platas (2014) using data from 2005 to 2012. The author excludes Aguascalientes and Morelos for the initial years, as they did not collect taxes during that period. The results indicate that economically weaker states, such as Oaxaca, face difficulties in collecting taxes, and federal transfers can hinder local revenue generation.

Guillermo and Vargas (2016) estimated the SF for the 32 Mexican federal entities, calculating tax collection efficiency with state and municipal taxes: ISN, ISH and ownership tax during the period from 2003 to 2010. The variables they used include total population, GDP, the number of registered vehicles, the informal sector occupation rate, the number of workers registered with the IMSS, GDP from the temporary accommodation and food and beverage service sector. The results showed that ISN was the tax that collected the most during the study period. The most efficient federal entities in their tax collection were Mexico City, Chiapas, and Chihuahua, while the least efficient were Aguascalientes, Jalisco, and Campeche.

In a nutshell, the results of SF applications in Mexico seems to converge that the Mexican federal entities did not reach their maximum potential in any of the 3 levels of government (federal, state, or municipal taxes). They also allow to infer that the ISN explained the highest participation of revenue collection at the state level, whereas the ISH showed significant collection only in entities with a tourist vocation.

METHODS

Below are the equations to calculate the SFM for both ISN and ISH along with the variables used in each of them.

Specification of the Model for ISN

The equation to estimate the SF of the ISN is as follows:

$$LISN_{it} = \boldsymbol{f}(\ LOT\_\mathrm{IMSS1}_{\mathrm{it}},\ TOSI_{it},\ LLPIB_{it}, PPOB_{it}\ ) \quad [2]$$

Where:

$i = (1, \ldots, 32)$.

$t = (2010, \ldots, 2020)$.

$LISN_{it}$ = natural logarithm of ISN for federal entity i during period t in pesos. The ISN is collected by employers based on labor transactions arising from employee service provision (Suprema Corte de Justicia de la Nación [SCJN], 2012; INEGI, 2022c).

LOT_IMSSI_{it}= natural logarithm of the number of workers registered with the Mexican Social Security Institute (IMSS) for federal entity *i* in period *t*, measured in thousands of workers. This variable quantifies the insured working population (those with a social security number in the institution) receiving medical services and economic benefits from this institution (IMSS, 2023; Tableau Software, 2022).

$TOSI_{it}$= rate of occupation in the informal sector of federal entity *i* in period t. This measures the percentage of the employed population working in the informal sector (Banco de México [BANXICO], 2023; INEGI, 2022f).

$LLPIB_{it}$ = natural logarithm of the Gross Domestic Product (GDP) for federal entity *i in* period *t,* in billions of constant 2013 pesos. It is the sum of the market value of final goods and services generated within the national territory during a specific period (INEGI, 2022e; INEGI, 2023).

$PPOB_{it}$= total population of federal entity *i* in period *t,* in millions of inhabitants. It is the number of individuals living in a geographical area and forming a five-year age group according to their gender (INEGI, 2022b; CONAPO, 2023). We obtained the total population figures from CONAPO data, which provides projections for the population of Mexico and its federal entities from 2016 to 2050. Utilizing these numbers and INEGI's five-year data, we supplemented the series for the years 2010 to 2015.

A positive and significant relationship is expected with all variables except the rate of employment in the informal sector in each federal entity.

Estimation of the Model for ISN

Next, we present the estimation of SF for each of the three random error distributions (semi-normal, exponential, and truncated normal). Subsequently, the distribution with the best fit is selected. In case of no consensus among the criteria, the distribution is chosen if at least 2 out of the 3 criteria consider it the best option.

Based on the findings presented in Table 3, the Wald statistic (2631.01) and BIC statistic (404.2219) both indicate that the semi-normal distribution demonstrates the strongest fit. Therefore, this error distribution model has been chosen for the analysis. The detailed estimates are provided in Annexes 1, 2, and 3.

Table 3. ISN Statistics

STOCHASTIC FRONTIER			
Random Errors Probability Distribution	**Wald Statistic**	**Bayesian Information Criterion (BIC)**	**Log Likelihood**
Semi normal	2631.01	404.2219	-181,58822
Exponential	2156.01	415.8714	-187,41298
Truncated normal	2420.64	406.4381	-179,76454

Source: Own elaboration.

The SF is a model that assumes a tax collection function exposed to random shocks, with a degree of inefficiency in revenue collection that prevents federal entities from realizing their full potential. Thus, technical efficiency is within the range of (0, 1], where if it is equal to 1, tax collection would be entirely efficient, and if less than 1, it would be inefficient (Guillermo & Vargas, 2016). The estimation of average inefficiency in ISN collection processes is graphically presented below, with federal entities ordered from most to least efficient. In other words, the most efficient federal entity is the one closest to the value of 1.

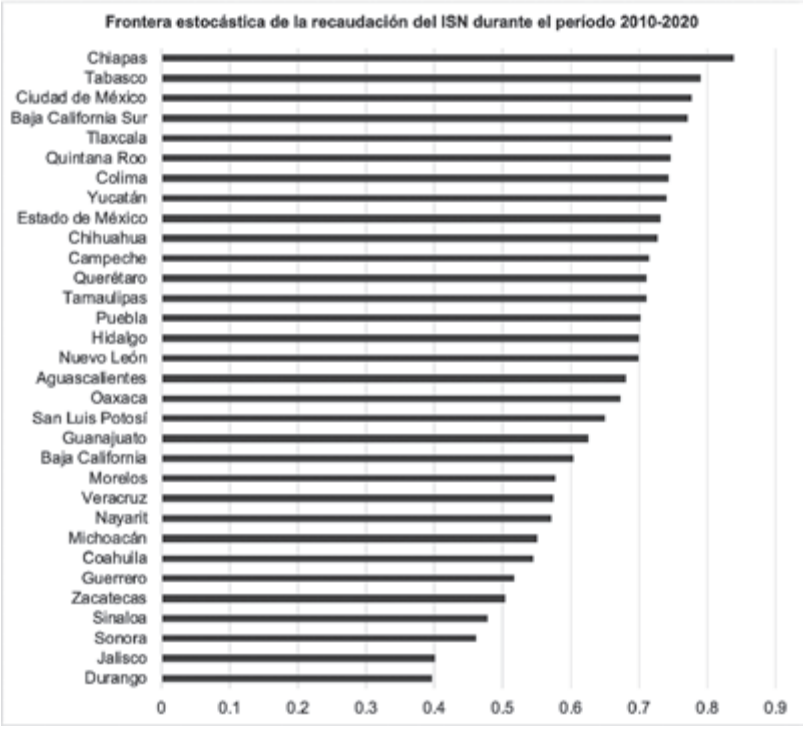

Figure 1. Average Estimated Inefficiency in ISN Tax Collection from 2010 to 2020

Source: Own elaboration.

Chiapas is the entity with the highest efficiency in tax collection (0.8383), followed by Tabasco (0.7904), Mexico City (0.7769), Baja California Sur (0.7707), and Tlaxcala (0.7474). These results align with Guillermo and Vargas (2016), indicating that Chiapas, Mexico City, and Tlaxcala achieve the highest levels of revenue collection. Similarly, the satisfactory outcome observed in Mexico City coincides with Bonet and Rueda (2011), Puente and Rodríguez (2011), and Castañeda and Pardinas (2012). In contrast, Durango (0.3973) is the most inefficient state in the collection of ISN, followed by Jalisco (0.4014), Sonora (0.4607), Sinaloa (0.4784), and Zacatecas (0.5037). Guillermo and Vargas (2016) also agree that Jalisco is one of the entities with higher inefficiency in revenue collection. Table 4 presents the average efficiency value of ISN during the period 2010-2020 for each federal entity.

Table 4. Average Efficiency of ISN during the Period 2010-2020

State	Efficiency
Chiapas	0.838315791
Tabasco	0.790469645
Ciudad de México	0.776978318
Baja California Sur	0.770774482
Tlaxcala	0.747413064
Quintana Roo	0.746172227
Colima	0.744264118
Yucatán	0.741143991
Estado de México	0.731575745
Chihuahua	0.726720673
Campeche	0.7144832
Querétaro	0.7110215
Tamaulipas	0.710780773
Puebla	0.701345955
Hidalgo	0.6999605
Nuevo León	0.699190736
Aguascalientes	0.680545355
Oaxaca	0.673293436
San Luis Potosí	0.649586709
Guanajuato	0.625934655
Baja California	0.603386727
Morelos	0.5772102
Veracruz	0.574165318
Nayarit	0.572293127
Michoacán	0.550536627
Coahuila	0.544486
Guerrero	0.517252227
Zacatecas	0.503717991
Sinaloa	0.478437082
Sonora	0.460770145
Jalisco	0.401427655
Durango	0.397393782

Source: Own elaboration.

Specification of the Model for ISH

The function to estimate the MFE of the ISH is as follows:

$$LISH_{it} = f(PIB_{SERV_{it}}, POCUP_{it}, LLPIB_{it}, PPOB_{it}) \quad [3]$$

Where:

$i = (1, \ldots, 32)$

$t = (2010, \ldots, 2020)$

$LISN_{it}$ = natural logarithm ISH for federal entity i during period t in pesos. This variable measures the revenue from lodging services (DATATUR, 2023a). The

hotelier is the withholder of this tax, while the guest is the one who pays this tax (DATATUR, 2023b; INEGI, 2022d).

$PIB_{SERV_{it}}$ = percentage of the GDP generated in the temporary accommodation and food and beverage preparation sector of federal entity *i* in period *t* (DATATUR, 2023a). This variable encompasses the activities of temporary accommodation service companies (hotels, motels, cabins, and campsites, for example) along with the preparation and sale of food and beverages, both for on-site consumption and take-out (México ¿Cómo vamos?, 2023).

$POCUP_{it}$ = hotel occupancy rate percentage of federal entity *i* in period *t* (DATATURa). This counts the number of occupied rooms divided by the total available rooms during a specific period. It is then multiplied by 100 to express it as a percentage (DATATUR, 2023b).

$LLPIB_{it}$ = natural logarithm of the Gross Domestic Product (GDP) for federal entity *i* in period *t,* in billions of constant 2013 pesos. It is the sum of the value of final goods and services generated within the country's territory during a specific period (INEGI, 2023).

$PPOB_{it}$ = total population of federal entity *i* in period *t,* in millions of inhabitants. It is the number of individuals living in a geographical area and forming a five-year age group according to their gender (INEGI, 2022b; INEGI, 2022e; CONAPO, 2023). We obtained the total population figures from CONAPO data, which provides projections for the population of Mexico and its federal entities from 2016 to 2050. Utilizing these numbers and INEGI's five-year data, we supplemented the series for the years 2010 to 2015. A positive and significant relationship is expected with all variables.

While published works on estimating technical efficiency using this methodology have significantly increased in recent years, there is still no consensus on the best method for its estimation (Vergara, 2006). Therefore, to calculate the technical efficiency of the federal entities in collecting ISN and ISH, three probability distributions of random errors are evaluated: semi-normal, exponential, and truncated normal (Romero, 2016). In order to choose the probability distribution of random errors that provides the best fit, three criteria were employed: the Wald statistic, the Bayesian Information Criterion (BIC), and the log-likelihood (Fried et al., 2008). The objective of each of these criteria is detailed below, along with their decision rule.

The Wald statistic measures the overall significance of the estimated model. According to this criterion, the higher the value of the Wald statistic, the greater the evidence that the explanatory variables contribute to the variation of the dependent variable (Berger, 1997). On the other hand, the Bayesian

Information Criterion (BIC) considers that the model with the best fit will be the one that minimizes this information criterion, i.e., the one with a lower BIC (Berger & Humphrey, 1997). Finally, according to the log-likelihood function, the most suitable model for describing the relationship between the variables under study—or the most likely in statistical terms is the one whose absolute value is greater (Berger & Humphrey, 1997). The 'FRONTIER' module of the STATA software (STATA, 2023) is utilized for estimating the SF function.

Estimation of the Model for ISH

Once again, the FRONTIER software is used. The results of the three statistics for each of the distributions of random errors are presented in Table 5. According to the results, both the Wald statistic (530.11) and the log-likelihood (-392.37429) indicate that the semi-normal distribution has the best goodness of fit. The detailed estimates are shown in Annexes 4, 5, and 6. The semi-normal error distribution is chosen because 2 out of 3 tests indicate it as the most appropriate. Annex 4 presents the estimated coefficients with a semi-normal distribution.

Table 5. ISH Statistics

STOCHASTIC FRONTIER			
Probability of Distribution in Random Errors	**Wald Statistic**	**Bayesian Information Criterion (BIC)**	**Log Likelihood**
Semi normal	530.11	825.6736	-392.37429
Exponential	506.19	823.3989	-391.23692
Truncated normal	505.68	829.2469	-391.23771

Source: Own elaboration.

Next, Figure 2 illustrates estimation of average inefficiency in ISH collection processes, with federal entities ordered by their efficiency from highest to lowest. In other words, the most efficient federal entity is closer to the value of 1.

Baja California Sur is the federal entity that efficiently collects ISH (0.7752), followed by Guerrero (0.7613), Nayarit (0.7564), Sinaloa (0.7324), and Baja California (0.7248). It is interesting to contrast these results with the average collection of this tax per federal entity (Table 4). The nominal average hotel tax collection from 2010 to 2020, in descending order, is led by Baja California Sur ($211,654,190), Guerrero ($98,233,563), Nayarit ($114,749,642), Sinaloa ($72,168,053), and Baja California ($78,514,655). Thus, it is observed that there are entities that collect more

money but are not necessarily the most efficient in their collection. This highlights that if there is an increase in productive activity, local governments need to have more efficient management and oversight capabilities to collect revenue. It is worth noting that Guillermo and Vargas (2016) observed the same during the 2003-2010 period.

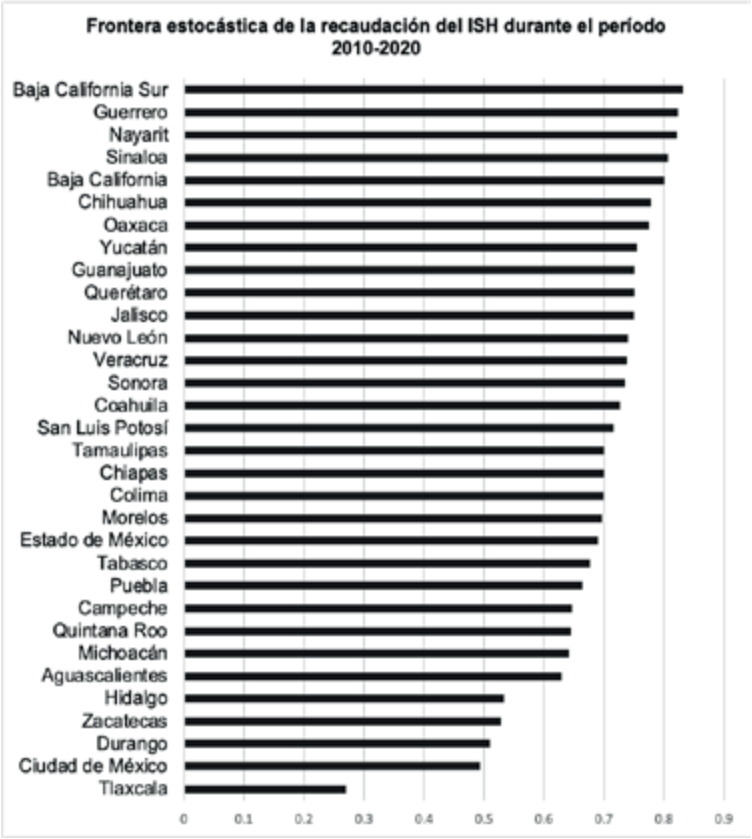

Figure 2. Average Estimated Inefficiency in ISH Tax Collection from 2010-2020

Source: Own elaboration.

On the other hand, the least efficient entities in collecting ISH are Tlaxcala (0.2191), followed by Durango (0.3782), Mexico City (0.3811), Hidalgo (0.3983), and Zacatecas (0.3994). The average collection of the tax from 2010 to 2020 was: Tlaxcala ($2,012,465), Durango ($6,281,214), Mexico City ($320,900,365), Hidalgo ($8,181,185), and Zacatecas ($6,975,843).

Table 6. Average Efficiency of ISH during the Period 2010-2020

State	Efficiency
Baja California Sur	0.83267982
Guerrero	0.82336818
Nayarit	0.82116031
Sinaloa	0.80658847
Baja California	0.80095883
Chihuahua	0.77767357
Oaxaca	0.77567546
Yucatán	0.75402045
Guanajuato	0.75046216
Querétaro	0.75039113
Jalisco	0.74904973
Nuevo León	0.74059414
Veracruz	0.73746398
Sonora	0.73581344
Coahuila	0.72585432
San Luis Potosí	0.7160795
Tamaulipas	0.70044968
Chiapas	0.69977346
Colima	0.6996249
Morelos	0.69592659
Estado de México	0.6903314
Tabasco	0.67697228
Puebla	0.66445532
Campeche	0.64660547
Quintana Roo	0.64506105
Michoacán	0.64242421
Aguascalientes	0.62894697
Hidalgo	0.5341748
Zacatecas	0.52830313
Durango	0.51006159
Ciudad de México	0.49308113
Tlaxcala	0.27006362

Source: Own elaboration.

The MFE estimates for both ISN and ISH are conducted using a semi-normal distribution of random errors. Despite this commonality, the results obtained differ between the two taxes. In the stochastic collection frontier of ISN, the states are ranked as follows: Chiapas is the most efficient, followed by Tabasco, Mexico City, Baja California Sur, and Tlaxcala, based on payroll registration. On the other hand, the least efficient entities were Durango, Jalisco, Sonora, Sinaloa, and Zacatecas.

Regarding the ISH frontier, Baja California Sur is the most efficient entity, followed by Guerrero, Nayarit, Sinaloa, and Baja California. These states are recognized for capitalizing on their tourist areas and beaches. Conversely, the least efficient entity was Tlaxcala, followed by Mexico City, Durango, Zacatecas, and Hidalgo.

In the ISH analysis, it is observed that entities with beaches and tourist activities are the most efficient, while this does not apply to ISN, as the collection of this tax varies according to the fluctuation of employees registered in companies. Baja California stands out as the only efficient entity in collecting both taxes. In summary, it is concluded that there are federal entities that collect more money but are not efficient in their collection. Local governments have different capacities for management and oversight of revenue collection, highlighting a situation that requires attention.

DISCUSSION

The estimation of the ISN aligns with the findings of Puente and Rodríguez (2011) and Guillermo and Vargas (2016), particularly regarding the number of workers affiliated with the IMSS, GDP at the state level, and total population at the state level. This consistency reinforces the validity of these variables as determinants of ISN tax collection in Mexico.

However, the efficiency of ISN collection varies significantly across different Mexican states and is influenced by several factors. The disparities in revenue collection efficiency suggest that local governments possess varying capabilities to manage tax collection processes effectively. Interestingly, states with higher GDP on average do not necessarily exhibit higher efficiency in ISN collection. This observation implies that local economic conditions, such as the composition of the workforce and the prevalence of informal employment, play a crucial role in determining tax collection outcomes. Moreover, fluctuations in the number of employees registered with the IMSS can directly impact the efficiency of ISN collection, highlighting the dynamic nature of this revenue source.

Similarly, the ISH estimation is consistent with the results of Puente and Rodríguez (2011) and Guillermo and Vargas (2016) concerning the total population at the state level. Additionally, the GDP generated in the temporary accommodation and food and beverage preparation sector at the state level, as well as the rate of hotel occupancy, shows a strong alignment with the findings of Puente and Rodríguez (2011).

The efficiency of ISH collection is also influenced by several key factors. States with beachfront locations and significant tourist attractions tend to demonstrate higher efficiency in ISH collection. This correlation is primarily due to the fact that tourism generates a larger taxable base for accommodation taxes, thereby enhancing revenue collection. Furthermore, the overall economic context of a state, including factors such as GDP and employment rates in the tourism sector, plays a critical role in determining ISH collection efficiency.

These findings underscore the importance of adopting a tailored approach to enhancing ISH collection efficiency at the local level. Local governments must consider the unique economic conditions and industry dynamics within their jurisdictions to optimize tax collection strategies.

CONCLUSIONS

This study examines the effectiveness of tax collection for ISN and ISH across 32 Mexican federal entities during 2010-2020. In both cases the estimations are conducted utilizing the SF model,

a widely used tool in public finance research, considering a semi-normal random error distribution.

The analysis highlights disparities in revenue collection efficiency, indicating differences in the capabilities of local governments. For the ISN Chiapas is identified as the most efficient state, followed by Tabasco, Mexico City, Baja California Sur, and Tlaxcala. Conversely, Durango, Jalisco, Sonora, Sinaloa, and Zacatecas are noted as the least efficient in ISN collection. States that demonstrate the highest levels of efficiency do not necessarily correspond with those having the highest GDP or receiving the lowest intergovernmental transfers.

The analysis of the ISH presents a different scenario. Baja California Sur emerges as the most efficient entity, along with Guerrero, Nayarit, Sinaloa, and Baja California. It is interesting to note that entities with coastal areas and significant tourist attractions exhibit higher efficiency in ISH collection. Conversely, Tlaxcala, Mexico City, Durango, Zacatecas, and Hidalgo are identified as the least efficient in ISH collection.

The analysis conducted by ISH indicates that entities with beachfront locations and tourist attractions demonstrate higher levels of efficiency. In contrast, the ISN data shows that tax collection is subject to fluctuations based on changes in employee numbers. Baja California emerges as the sole entity demonstrating efficiency in both tax categories. We also found that states with higher revenue collection rates may not necessarily be the most efficient in their tax collection practices. The study underscores the importance of effective management and oversight capabilities, particularly considering fluctuations in employee registration for ISN and the dynamics of tourism for ISH.

These findings stress the importance of tailored approaches at the local level to improve revenue collection efficiency. Local governments must address specific challenges within their economic and social contexts, taking into consideration factors affecting tax collection for both ISN and ISH. This study offers valuable insights for policymakers, serving as a foundation for well-informed decision-making to enhance the fiscal environment in Mexican federal entities.

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ANNEXES

Annex 1. SF for the ISN Assuming Semi Normal Error Distribution

frontier lisn tosi1 lot_imss_1 ppob llpib, distribution(hnormal)
Wald chi2(4)=2631.01
Log verosimilitud= -181.58822

lisn	Coef.	Std. Err	z	P>|z|	[95% Conf. Interval]	
tosi1	0,341	0,382	0,89	0,372	-0,408	1,089
lot_imss_1	0,486	.052751009817 .053807	9,21	0	.38.21886	0,589
ppob	0,024	0,468	2,47	0,013	0,005	0,044
llpib	0,672		12,5	0	0,567	0,778
_cons	8,460		18,09	0	7,543	9,377
/lnsig2v	-3,225	0,337	-9,57	0	-3,885	-2,564
/lnsig2u	-0,965	0,161	-5,99	0	-1,281	-0,649
sigma_v	0,199	0,034			0,143	0,277
sigma_u	0,617	0,050			0,527	0,723
sigma2	0,421	0,052			0,318	0,523
lambda	3,095	0,078			2,943	3,248

estat ic
Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	352	.	-181,588	7	377,176	404,222

Source: Own elaboration.

Annex 2. SF for the ISN Assuming Exponential Error Distribution

frontier lisn tosi1 lot_imss_1 ppob llpib, distribucion(exponencial)

Wald chi2(4)=2156.01
Log verosimilitud= -187.41298
estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	352	.	-187,413	7	388,826	415,871

Source: Own elaboration.

Annex 3. SF for ISN Assuming Normal Truncated Error Distribution

frontier lisn tosi1 lot_imss_1 ppob llpib, distribution(hnormal)
Wald chi2(4)= 2420.64
Log verosimilitud = -179.76454
estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	352	.	-179,765	8	375,529	406,438

Source: Own elaboration.

Annex 4. SF for the ISH Assuming Semi-Normal Error Distribution

frontier lish pib_serv pocup ppob llpib, distribution(hnormal)
Wald chi2(4)= 530.11
Log verosimilitud = -392.37429

lish	Coef.	Std. Err	z	P>|z|	[95% Conf. Interval]	
pib_serv	0,000	0,000	13,33	0	0,000	0,000
pocup	1,456	0,460	3,16	0,002	0,554	2,358
ppob	0,038	0,022	1,74	0,082	-0,005	0,081
llpib	-0,033	0,086	-0,38	0,703	-0,202	0,136
_cons	16,706	1,149	14,54	0	14,455	18,958
/lnsig2v	-1,099	0,262	-4,2	0	-1,612	-0,587
/lnsig2u	-0,417	0,397	-1,05	0,294	-1,194	0,361
sigma_v	0,577	0,075			0,447	0,746
sigma_u	0,812	0,161			0,551	1,198
sigma2	0,992	0,189			0,621	1,364
lambda	1,407	0,230			0,956	1,858

estat ic
Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	346	.	-392,374	7	798,749	825,674

Source: Own elaboration.

Annex 5. SF for the ISH Assuming Exponential Error Distribution

frontier lish pib_serv pocup ppob llpib, distribution(exponential)
Wald chi2(4)= 506.19
Log verosimilitud = -391.23692
estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	346	.	-391,237	7	796,474	823,399

Source: Own elaboration.

Annex 6. SF for ISH Assuming Normal Truncated Error Distribution

frontier lish pib_serv pocup ppob llpib, distribution(tnormal)
Wald chi2(4)= 505.68
Log verosimilitud = -391.23771
estat ic

Akaike's information criterion and Bayesian information criterion

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
.	346	.	-391,238	8	798,475	829,247

Source: Own elaboration.

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Fertilizantes en la producción agrícola: un análisis de la percepción de uso

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*Margarita Elluz Calle Arancibia***

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Resumen: El objetivo de esta investigación fue analizar la percepción de los agricultores sobre el uso de fertilizantes en la producción agrícola del Valle del Cunas, Junín, Perú, abordando la dependencia de estos insumos para la productividad agrícola y los diversos factores que influyen en su uso. Se utilizó un enfoque cualitativo con el método hipotético deductivo de diseño no experimental y de corte transversal. La población fue de 250 agricultores del mismo subsector hídrico, seleccionando una muestra de 47 mediante muestreo no probabilístico por conveniencia. La recolección de datos se realizó en dos etapas: entrevistas abiertas a 7 agricultores y un cuestionario a 40. Los resultados mostraron que los fertilizantes son cruciales, especialmente para cultivos como papa y maíz, con una notable preferencia por el fosfato diamónico (72.5 %), cloruro de potasio (57.5 %) y nitrato de amonio (37.5 %). Sin embargo, el 92.5 % de los agricultores enfrentan dificultades para adquirir fertilizantes, a pesar de un aumento del 70 % en su disponibilidad. La conclusión resalta la necesidad de políticas gubernamentales que mejoren la accesibilidad y distribución de fertilizantes, y apoyen específicamente a los agricultores de pequeña y mediana escala para asegurar un desarrollo agrícola sostenible en la región.

Palabras clave: economía del consumidor, análisis empíricos, agricultura, recursos naturales, energía, medio ambiente, otros productos primarios, Perú.

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Fertilizers in Agricultural Production: An Analysis of the Perception of Use

Abstract: The objective of this research was to analyze the perception of farmers on the use of fertilizers in agricultural production in the Cunas Valley, Junín, Peru, addressing the dependence of these inputs for agricultural productivity and the various factors that influence their use. Using a qualitative approach, 250 farmers were studied and a sample of 47 was selected through non-probabilistic convenience sampling. Data collection was carried out in two stages: open interviews with 7 farmers and a questionnaire with 40 farmers. The results showed that fertilizers are crucial, especially for crops such as potatoes and corn, with a notable preference for diammonium phosphate (72.5%), potassium chloride (57.5%) and ammonium nitrate (37.5%). However, 92.5% of farmers face difficulties in acquiring fertilizers, despite a 70% increase in its availability. The conclusion highlights the need for government policies that improve the accessibility and distribution of fertilizers, and specifically support small and medium-scale farmers to ensure sustainable agricultural development in the region.

Keywords: consumer economics, empirical analysis, agriculture, natural resources, energy, environment, other primary products, Perú.

INTRODUCCIÓN

La agricultura es uno de los sectores más importantes en la actividad económica de muchos países. En Perú, este sector contribuyó en un 6 % al producto interno bruto (PBI) para los años 2018 y 2019 (Ministerio de Economía y Finanzas [MEF], 2023). A escala global, la agricultura familiar representa entre el 70 y el 80 % de las tierras cultivables, y suministra el 80 % de los alimentos (Organización de las Naciones Unidas para la Agricultura y la Alimentación [FAO], 2022a). En Perú, la agricultura familiar es crucial, representa el 97 % de los 2.2 millones de unidades agropecuarias y ocupa al 83 % de los trabajadores agrícolas (Ministerio de Agricultura y Riego [MIDAGRI], 2021).

Dentro de este escenario local y mundial, los fertilizantes se destacan como materiales indispensables que promueven el crecimiento de las zonas agrícolas y optimizan la producción en el sector. Además, dada su importancia, se espera un aumento significativo en la demanda de fertilizantes tanto a nivel global como en Latinoamérica. Según estimaciones del Banco Central de Reserva del Perú (BCRP, 2022), entre 2021 y 2024 se prevé un aumento de 2.2 millones de toneladas métricas en el consumo de fertilizantes en Latinoamérica, lo cual significa una contribución de aproximadamente un 13 % al consumo global de fertilizantes (BCRP, 2022).

En el caso específico de Perú, los datos del Banco Mundial (2023) revelan que el consumo anual de fertilizantes, medido en términos de nitrógeno (N), óxido de fósforo (P2O5) y óxido de potasio (K2O), alcanza las 470 000 toneladas métricas. Este consumo representa alrededor del 0.26 % del total mundial y cerca del 2 % en Latinoamérica. Estas cifras no solo subrayan la importancia creciente de los fertilizantes en la agricultura peruana, sino que también resaltan la necesidad de una gestión eficiente de estos insumos para impulsar la productividad agrícola y satisfacer tanto las demandas locales como globales en un mundo cada vez más interconectado (Valdivia, 2022).

La conexión inherente de la generación de alimentos, la aplicación de fertilizantes y la economía agraria mundial subraya la exigencia de una estrategia balanceada y sostenible para asegurar la seguridad alimenticia y el progreso económico en Perú y en el mundo (Posadas, 2022a). Los fertilizantes no solo aumentan la productividad de los cultivos, sino que también mejoran la calidad del suelo al proporcionar nutrientes esenciales para el crecimiento saludable de los cultivos y corregir deficiencias nutricionales. Por lo tanto, su aplicación oportuna es crucial para mantener la productividad agrícola y la salud del suelo, y asegurar así un desarrollo sostenible en la agricultura local (Dirección Regional de Agricultura de Junín [DRA], 2022).

La región de Junín, específicamente los valles del Mantaro y del Cunas, enfrenta desafíos significativos en su producción agrícola. Según datos del Ministerio de Agricultura y Riego (MINAGRI, 2022), la productividad agrícola en la región ha experimentado variaciones debido a factores climáticos y problemas de gestión. En el año 2021, la producción de ciertos cultivos como el maíz y la papa se vio afectada por sequías prolongadas, lo que generó pérdidas significativas para los agricultores locales. Esta situación resalta la importancia de comprender el estado actual de la producción agrícola en el Valle del Cunas para identificar áreas de mejora y promover prácticas más eficientes y sostenibles (MINAGRI, 2022).

La percepción de los agricultores sobre los usos de los fertilizantes es esencial para promover prácticas agrícolas más sostenibles y eficientes. Según una encuesta reciente realizada por el Instituto Nacional de Estadística e Informática (INEI, 2023), se observa una falta de conocimiento entre los agricultores sobre la función y aplicación adecuada de los fertilizantes. Según esta entidad, solo el 40 % de los agricultores conocen los beneficios de los fertilizantes orgánicos en comparación con los químicos. Esto sugiere la necesidad de abordar esta problemática y brindar capacitación y asistencia técnica para mejorar el uso de fertilizantes en la región (INEI, 2023).

La disponibilidad de fertilizantes en el Valle del Cunas puede ser un factor crucial que influye en la producción agrícola. Según datos del MINAGRI (2022), algunos agricultores de la región enfrentan dificultades para acceder a fertilizantes de calidad debido a problemas de distribución y suministro. Se estima que solo el 60 % de los agricultores tienen acceso regular a estos insumos, mientras que el restante 40 % enfrenta obstáculos similares, lo que ha generado repercusiones directas en la producción agrícola. Específicamente, estos retrasos afectaron la siembra de cultivos de ciclo corto como el maíz y la papa, según señala el informe de Lozano et al. (2018). El retraso en la distribución de fertilizantes por la Dirección Regional de Agricultura de Junín afectó la producción agrí-

cola local, disminuyendo la calidad y cantidad de la cosecha y los ingresos de los agricultores. No obstante, los fertilizantes también mejoran la calidad del suelo al proporcionar nutrientes esenciales para el crecimiento saludable de los cultivos y corregir deficiencias nutricionales. Por lo tanto, su aplicación oportuna es crucial para mantener la productividad agrícola y la salud del suelo, lo cual asegura un desarrollo sostenible en la agricultura local (DRA, 2022).

La demanda de fertilizantes por parte de los agricultores puede estar influenciada por diversos factores. Según una investigación realizada por el Instituto Nacional de Innovación Agraria (INIA, 2021), es esencial comprender la percepción de los agricultores sobre la demanda de fertilizantes para promover su uso adecuado y sostenible. Durante la última temporada de siembra se observó un aumento del 15 % en la demanda de fertilizantes nitrogenados debido a la expansión de cultivos comerciales en la región. Una demanda informada y orientada puede contribuir significativamente a mejorar la eficiencia y rentabilidad de la producción agrícola en el Valle del Cunas (INIA, 2021).

Las políticas agrícolas ejercen una influencia considerable en las decisiones y prácticas de los agricultores en relación con el uso de fertilizantes y otros insumos agrícolas (Fernández, 2021). Según datos proporcionados, estas políticas desempeñan un papel crucial en la configuración del panorama agrícola; así pues, revelan que el 70 % de los agricultores encuestados expresaron preocupaciones sobre la implementación de ciertas políticas que limitan el acceso a subsidios para la adquisición de fertilizantes. Esta comprensión es esencial para garantizar una gestión adecuada de los recursos agrícolas y para promover la competitividad del sector en la región (MINAGRI, 2022).

Así, la agricultura peruana, especialmente en los tres cultivos principales (maíz, papa y arroz), depende en gran medida de los fertilizantes, los cuales constituyen un porcentaje significativo de los costos de producción. Se estima que los fertilizantes representan entre el 20 y el 30 % de los costos totales por hectárea en estos cultivos (MINAGRI, 2022). Esta alta participación resalta la necesidad de un manejo adecuado y eficiente de los fertilizantes para asegurar la rentabilidad de las actividades agrícolas. El uso de fertilizantes es fundamental para satisfacer las necesidades nutricionales de los cultivos y mejorar la productividad agrícola. Los suelos en Perú presentan variaciones en su composición química, con deficiencias comunes de nitrógeno, potasio, fósforo, calcio y otros micronutrientes esenciales. Estos nutrientes son cruciales para el crecimiento y desarrollo de los cultivos, y su carencia puede limitar significativamente el rendimiento agrícola (DRA, 2022). El uso de fertilizantes permite corregir estas deficiencias y asegurar una producción óptima.

A pesar de la importancia de los fertilizantes, su uso y manejo en el Valle del Cunas, región de Junín, presenta varios desafíos. La disponibilidad irregular de fertilizantes, el conocimiento limitado sobre su aplicación y las barreras económicas y políticas afectan negativamente la productividad agrícola en la región. Además, las prácticas agrícolas actuales no siempre consideran las características específicas del suelo y las necesidades nutricionales de los cultivos, lo que puede llevar a un uso ineficiente de los fertilizantes y a una menor sostenibilidad del sistema agrícola.

La hipótesis central de esta investigación es que una gestión adecuada y el conocimiento técnico sobre el uso de fertilizantes pueden mejorar significativamente la productividad agrícola en el Valle del Cunas. Diversos estudios han demostrado la importancia de la capacitación y la asistencia técnica para los agricultores en el manejo de fertilizantes. Investigaciones previas en otras regiones del Perú y en países con condiciones agrícolas similares han evidenciado que el acceso a información y recursos adecuados puede incrementar la eficiencia del uso de fertilizantes y, consecuentemente, la productividad agrícola (Fernández, 2021; INIA, 2021).

Es necesario considerar aquí los requerimientos nutricionales específicos de los cultivos incluidos en el análisis. Los suelos del Valle del Cunas presentan características químicas variadas en cuanto a la presencia de nitrógeno, potasio, fósforo, calcio y otros elementos menores. Evaluar estas características puede permitir entender mejor las necesidades de fertilización y formular recomendaciones más precisas para el manejo de los cultivos en la región. Es por ello que esta investigación tiene como objetivo general analizar la percepción de los agricultores con respecto al papel de los fertilizantes en la producción agrícola del Valle del Cunas, Junín, Perú.

Esto se logrará a partir de (1) la descripción del estado situacional de producción agrícola del Valle del Cunas en la región Junín en Perú; (2) la identificación de la percepción de los agricultores sobre los usos de los fertilizantes en la producción agrícola; (3) la identificación de la percepción de los agricultores sobre la influencia de la oferta de los fertilizantes en la producción agrícola; (4) la identificación de la percepción de los agricultores sobre la demanda de los fertilizantes en la producción agrícola y (5) la identificación de la percepción de los agricultores sobre la influencia de las políticas agrícolas en la producción agrícola.

REVISIÓN DE LA LITERATURA

En el ámbito agrícola, los fertilizantes se han convertido en elementos fundamentales para mejorar la productividad y calidad de los cultivos, ya que son sustancias químicas o naturales empleadas con el objetivo de enriquecer el suelo y

suministrar nutrientes esenciales a las plantas (De la Torre & De Janvry, 2010). Ya sean de origen orgánico o inorgánico, los fertilizantes son aplicados en las áreas de cultivo para proporcionar los elementos necesarios para el crecimiento óptimo de las plantas. Estos nutrientes cruciales incluyen nitrógeno, fósforo, potasio y otros micronutrientes, que son esenciales para garantizar que los cultivos reciban los componentes vitales que necesitan. Esta práctica agrícola, respaldada por estudios como el de Reyes y Cano (2022), no solo asegura cosechas abundantes, sino que también contribuye significativamente a la producción agrícola sostenible y al desarrollo económico del país.

El marco teórico de esta investigación se basa en la teoría de la difusión de innovaciones de Piñeiro et al. (2021), que explica cómo, por qué y a qué ritmo se difunden las nuevas ideas y tecnologías en diferentes culturas. Aplicada a la agricultura, esta teoría sugiere que la adopción de prácticas agrícolas mejoradas, como el uso eficiente de fertilizantes, depende de varios factores, incluyendo el conocimiento, las percepciones y las actitudes de los agricultores, así como el apoyo institucional y las políticas gubernamentales. Estudios previos han explorado la percepción y el uso de fertilizantes en diferentes contextos agrícolas. Por ejemplo, investigaciones realizadas por el INIA (2021) y el Instituto Nacional de Estadística e Informática (INEI, 2023) han proporcionado valiosa información sobre las prácticas y desafíos en el uso de fertilizantes en Perú. Estos trabajos servirán de referencia para la discusión de los datos y resultados en esta investigación. Además, diversos estudios han corroborado que una nutrición óptima de los cultivos, facilitada por la aplicación adecuada de fertilizantes, conlleva beneficios ambientales al reducir la presión sobre la expansión de tierras agrícolas y promover prácticas agrícolas más eficientes y sostenibles (Hernández et al., 2022).

En el marco de la economía, los fertilizantes se consideran bienes intermedios o insumos esenciales. Los bienes intermedios son productos utilizados en la fabricación de otros bienes y no están destinados directamente al consumo final. Los fertilizantes, al no ser consumidos directamente por las personas, sino empleados en la producción de alimentos y otros productos agrícolas, se clasifican como bienes intermedios vitales. Su papel fundamental en la cadena de suministro agrícola radica en su contribución al proceso productivo, puesto que mejora la eficiencia y la productividad en la producción de alimentos. Por ende, desempeñan un rol crucial en la economía agrícola del país (Mankiw & Taylor, 2019).

Los precios representan los valores monetarios asignados a bienes y servicios en el mercado, y reflejan la disposición de compradores y vendedores en las transacciones comerciales. La dinámica entre la oferta y la demanda

es crucial en la determinación de los precios: si la demanda supera la oferta, los precios tienden a subir, y viceversa. Estos precios actúan como indicadores importantes de la escasez, el valor atribuido y las condiciones del mercado, y tienen un impacto significativo en las decisiones de los consumidores, productores y agentes económicos en todos los sectores de la economía (Reguera, 2022).

Además, es crucial reconocer que los cambios en los precios tienen un impacto directo en el poder adquisitivo de los individuos, lo que afecta su bienestar económico. Aunque la función de utilidad establece preferencias, para entender completamente las variaciones en el bienestar, especialmente en situaciones de aumento de precios, es esencial explorar otras medidas. Este entendimiento profundo de las dinámicas de precios y su influencia en el bienestar económico es indispensable para economistas y formuladores de políticas en la toma de decisiones (Garavito, 2014).

Los precios de los fertilizantes, determinados por factores como costos de producción y políticas gubernamentales, son esenciales para las decisiones de los agricultores y la rentabilidad agrícola. La variación en estos precios puede influir en la percepción de los agricultores sobre su impacto en la producción y su capacidad de compra, lo que afecta su bienestar (Mankiw & Taylor, 2019).

Así mismo, el aumento en los precios de los fertilizantes puede perturbar la capacidad de compra de los agricultores, lo cual está directamente vinculado con su bienestar. A pesar de que la función de utilidad establece preferencias, es esencial explorar alternativas para evaluar el bienestar, especialmente en el contexto del incremento de precios de los fertilizantes (Garavito, 2014).

Principio del formulario

La oferta y la demanda son principios cruciales que regulan la relación entre productores y consumidores en un mercado. En el caso de los fertilizantes, la oferta representa la cantidad que los productores están dispuestos a vender, influenciada por costos y tecnología. La demanda, por otro lado, indica lo que los agricultores están dispuestos a comprar, afectada por precios agrícolas y condiciones climáticas. La intersección de oferta y demanda establece el precio y la cantidad de fertilizantes intercambiados. Conceptos como la elasticidad precio de la demanda y oferta son esenciales para comprender las reacciones de los agricultores a las fluctuaciones de precios en el mercado de fertilizantes (Mankiw & Taylor, 2019).

En la agricultura, los fertilizantes desempeñan un papel vital al proporcionar nutrientes esenciales como nitrógeno, fósforo y potasio, fundamentales para el desarrollo de las plantas y la calidad de los frutos. Su uso adecuado no solo aumenta la productividad y diversifica

los cultivos en áreas con limitaciones nutricionales, sino que también contribuye a mejorar la calidad de los alimentos producidos. Sin embargo, es crucial gestionar responsablemente su aplicación, adaptándola a las necesidades específicas del suelo y los cultivos. Esto implica emplear técnicas y cantidades precisas para maximizar los beneficios agrícolas y minimizar impactos ambientales y en la salud. La adopción de prácticas agrícolas sostenibles es esencial para lograr un equilibrio entre la productividad y la conservación del medio ambiente, que garantice así un desarrollo agrícola responsable (FAO, 2022b).

Las políticas arancelarias agrícolas son estrategias aplicadas por los gobiernos para regular el comercio de productos agrícolas a través de la imposición de aranceles, que son impuestos sobre las importaciones o exportaciones de estos productos. En ese sentido, podrían tener un impacto directo en la oferta y la demanda de fertilizantes. La imposición de aranceles a la importación de fertilizantes puede elevar los costos para los agricultores al aumentar los precios de los insumos, lo que a su vez podría afectar tanto la demanda como la percepción de los agricultores sobre la relación entre los precios de los fertilizantes y la producción de sus cosechas (OMS, 2022).

Considerando las expectativas futuras como un concepto clave para el entendimiento del tema, estas se refieren a las predicciones que los agentes económicos hacen sobre el comportamiento futuro de variables claves, como los precios, los ingresos y las condiciones del mercado. En esa línea, las expectativas futuras pueden influir en la oferta y demanda de fertilizantes. Por ejemplo, si los agricultores anticipan un aumento en los precios de los fertilizantes en el futuro, podrían optar por adquirir mayores cantidades en el presente para evitar costos más altos, lo que afectaría tanto la demanda actual como la percepción de los agricultores sobre la relación entre los precios de los fertilizantes y la producción agrícola (Mankiw & Taylor, 2019).

Las condiciones climáticas se consideran en el entorno ambiental en el que se lleva a cabo la producción agrícola, incluyendo factores como la temperatura, la humedad, las precipitaciones y la calidad del suelo. En este contexto, el clima y las condiciones agrícolas pueden desempeñar un papel significativo en la oferta y demanda de fertilizantes. Cambios climáticos adversos, como sequías o inundaciones, pueden afectar negativamente la producción de cultivos, lo que podría influir en la demanda de fertilizantes para mejorar la calidad del suelo y maximizar el rendimiento de las cosechas. La percepción de los agricultores sobre la influencia de los precios de los fertilizantes en la producción agrícola también puede estar influenciada por su experiencia en la

adaptación a condiciones climáticas cambiantes (International Fertilizer Association [IFA], 2021).

La producción agrícola se refiere al proceso de cultivo, cuidado y cosecha de plantas y cultivos con el objetivo de obtener alimentos, productos vegetales y materias primas agrícolas. Involucra una serie de actividades que van desde la preparación del suelo, siembra, riego, aplicación de insumos como fertilizantes y pesticidas, hasta la cosecha y el procesamiento de los productos obtenidos. La producción agrícola es esencial para el suministro de alimentos y recursos para la población humana y animal, y es una parte fundamental de la economía en muchas regiones del mundo (Instituto Interamericano de Cooperación para la Agricultura [IICA], 2022).

La campaña agrícola se refiere al período de tiempo durante el cual se llevan a cabo las actividades agrícolas específicas relacionadas con el cultivo y manejo de un tipo particular de cultivo o cultivos en una región determinada. Esta campaña puede variar en función de factores como el clima, las condiciones de suelo y las prácticas agrícolas locales. Incluye actividades como la siembra, el riego, la aplicación de fertilizantes y pesticidas, el monitoreo del crecimiento de los cultivos y la cosecha. La duración de una campaña agrícola puede variar desde unos pocos meses hasta más de un año, dependiendo del tipo de cultivo y las condiciones climáticas y ambientales (IICA, 2022).

En ese marco, Gertler et al. (2017) argumentan que la diversificación de las temporadas de siembra ayuda a los agricultores a reducir la vulnerabilidad frente a variaciones climáticas y de mercado. Esta estrategia permite mantener la estabilidad económica y la seguridad alimentaria en comunidades agrícolas. Al diversificar los cultivos y planificar las siembras en diferentes épocas del año, los agricultores pueden mitigar riesgos climáticos, diversificar sus ingresos, mejorar la salud del suelo y garantizar la estabilidad alimentaria.

MÉTODO DEL ESTUDIO

El presente estudio es una investigación de tipo básico, que se desarrolla desde una perspectiva teórica, utilizando teorías existentes como referencia. Su objetivo es buscar nuevos conocimientos sin un propósito práctico específico e inmediato (Bernal, 2010). La investigación se enfoca en el problema del incremento de precios de los fertilizantes y su influencia en la producción de futuras campañas agrícolas.

La metodología de investigación empleada sigue el método hipotético-deductivo, pues se emplean procedimientos lógicos deductivos, iniciando desde una premisa o supuesto *a priori* que requiere ser demostrado (Sánchez et al., 2018).

El diseño de investigación es no experimental y de corte transversal, lo que significa que no se manipularon las variables y que la información se recopiló en un único momento a través de encuestas aplicadas a la muestra (Mendoza, 2014). La investigación utiliza el enfoque cualitativo; pues ayuda a profundizar la comprensión de fenómenos complejos como es el caso del incremento de los precios de los fertilizantes, Además, es útil para explorar áreas emergentes, comprender aspectos subjetivos y emocionales, y validar o desarrollar teorías en disciplinas sociales, culturales o psicológicas (Hernández et al., 2014).

El nivel o alcance de la investigación es descriptivo, es decir, se detallan las características, comportamientos y opiniones de los agricultores en relación con el tema, sin intervenir ni manipular las variables. La investigación recopila información detallada sobre las percepciones y experiencias de los agricultores, que proporciona una visión completa y comprensiva del panorama sin necesidad de realizar inferencias causales o explicativas. Este diseño metodológico es coherente con un alcance descriptivo, que busca ofrecer un panorama detallado de la realidad que enfrentan los agricultores frente al aumento de los precios de los fertilizantes (Hernández et al., 2014).

Población y muestra

El presente estudio se centra en la población agrícola perteneciente a la Junta de Usuarios del Subsector Hidráulico del Cunas, la cual está compuesta por 250 agricultores. Para llevar a cabo la investigación, se seleccionó una muestra de 47 agricultores mediante el método de muestreo no probabilístico por conveniencia: en una primera etapa, se efectuó una entrevista con preguntas abiertas a 7 agricultores; posteriormente, utilizando la información obtenida en estas entrevistas, se diseñó un cuestionario que fue administrado a 40 agricultores a través de encuestas. Los criterios utilizados para esta selección se basaron en factores subjetivos como la accesibilidad, disponibilidad de tiempo y la predisposición de los participantes.

Se utiliza la técnica de encuestas y el cuestionario como instrumento para recopilar datos. Se diseñó un cuestionario con 20 ítems para reunir información directamente relacionada con el tema de investigación. El cuestionario fue validado por juicio de expertos; así mismo, se hizo el cálculo de su validez bajo el criterio del coeficiente de V de Aiken y su confiabilidad mediante el coeficiente Alfa de Cronbach (Pino, 2018).

Procesamiento de recopilación de datos

Los datos recolectados se procesaron y analizaron utilizando una matriz en Excel para organizar la información. El análisis descriptivo se realizó con el *software* estadístico SPSS 26, previa comprobación de la normalidad de los datos.

Consideraciones éticas

Se garantiza la confidencialidad y privacidad de los participantes, asegurando que la información proporcionada no será divulgada sin su consentimiento. Se aplicó un consentimiento informado antes de la participación, explicando claramente los objetivos de la investigación, el uso previsto de los datos y cualquier riesgo potencial. Además, se aseguró que los participantes tuvieran la libertad de retirarse en cualquier momento sin sanción alguna u otras consecuencias negativas. Las preguntas fueron diseñadas para evitar cualquier sesgo que pueda influir en las respuestas de los participantes. Así mismo, la transparencia en la comunicación y la honestidad en la presentación de los resultados son principios claves para mantener la integridad ética de la presente investigación.

RESULTADOS Y ANÁLISIS

Para recopilar información, se contó con la participación de 47 agricultores del Valle del Cunas, a quienes se les aplicaron entrevistas y encuestas. A continuación, se presentan los resultados que se obtuvieron.En cuanto al género, se observa una mayoría de varones en la muestra, representado con el 62.5 % del total, mientras que las mujeres representan el 37.5 %. Aunque la diferencia no es muy amplia, sugiere una leve predominancia masculina en la muestra encuestada. Este hallazgo puede tener implicaciones importantes al analizar ciertos comportamientos o actitudes relacionados con el género en el contexto estudiado (Anexo 6).

Situación actual

La preponderancia de la papa y el maíz en la producción agrícola del Valle del Cunas se refleja en el hecho de que el 90 y el 57.5 % de los agricultores, respectivamente, los consideran como sus cultivos principales (Tabla 1). Estos cultivos destacan en la producción agrícola del Valle del Cunas, junto con la presencia diversificada de cultivos adicionales como la zanahoria y el ajo, y manifiestan la complejidad y la importancia de la actividad agrícola en la región en consonancia con el informe realizado por DRA (2022), que proporciona una visión integral de la estructura agrícola local, lo que puede permitir una comprensión más profunda de cómo los cambios en los precios de los fertilizantes podrían afectar la economía de los agricultores.

Así mismo, indica una estrategia adaptativa frente al aumento de precios de

los fertilizantes. Y está en concordancia con Lozano et al. (2018), ya que refleja la capacidad de los agricultores para ajustar sus prácticas agrícolas según las condiciones del mercado y maximizar así la producción y mitigar los riesgos asociados a la dependencia de una sola temporada de siembra. Esta flexibilidad resalta la habilidad de los agricultores para enfrentar los desafíos de adaptabilidad a los cambios climáticos y económicos.

La mayoría de los agricultores operan en una escala relativamente pequeña, pues el 47.5 % de ellos tienen menos de 5 hectáreas de terreno sembrado (Tabla 1). Este dato resalta la predominancia de agricultores de pequeña escala en la región. Además, este dato, respaldado por el informe del MINAGRI (2022), destaca la predominancia de agricultores de pequeña escala en la región y sugiere que el aumento de los precios de los fertilizantes podría impactar de manera más aguda en este segmento. Los pequeños agricultores podrían enfrentar desafíos adicionales para mantener su rentabilidad, debido a su limitada capacidad para absorber aumentos de costos y su menor acceso a recursos tecnológicos y financieros. Esta situación subraya la importancia de poner en marcha políticas específicas para apoyar a los agricultores de pequeña escala y garantizar la seguridad alimentaria y el desarrollo rural sostenible.

El rango de expectativas de cosecha entre los agricultores del Valle del Cunas, donde el 60 % espera obtener entre 1 y 15 toneladas, y un 32.5 % espera cosechar entre 16 y 30 toneladas, refleja tanto la moderada como la considerable capacidad de producción en la región (Tabla 1). Esta situación subraya la importancia de gestionar eficazmente los recursos agrícolas, incluidos los insumos como los fertilizantes, para asegurar una producción óptima y sostenible. Además, destaca la necesidad de políticas que promuevan un acceso equitativo a estos insumos, dada la importancia de la agricultura familiar en la economía local y global, tal como subraya la FAO (2022a).

El mercado de Huancayo es el principal lugar de venta (70 %), lo que revela una marcada dependencia de los mercados locales para la comercialización de productos agrícolas en la región (Tabla 1). Esta situación puede tener implicaciones significativas en la capacidad de los agricultores para ajustar los precios de venta de sus productos y para hacer frente a los aumentos en los costos de producción, como aquellos asociados con los fertilizantes. Además, la presencia de un 25 % de agricultores que venden en el mercado de Lima indica una diversificación en las estrategias de comercialización, lo que podría ofrecer oportunidades adicionales, pero también plantear desafíos logísticos y de competencia. En este contexto,

de acuerdo con el BCRP (2022), es importante implementar políticas que promuevan la diversificación de los canales de comercialización y que brinden apoyo logístico a los agricultores, para garantizar así la resiliencia del sector agrícola frente a fluctuaciones en los precios de los insumos y a la competencia en los mercados locales y regionales.

A continuación, la Tabla 1 presenta el resumen de los resultados más relevantes con respecto a la situación actual de la siembra en el Valle del Cunas.

Tabla 1. Situación actual

Ítems	Resultados
Cultivos principales	Papa (90 % de los agricultores), maíz (57.5 %), zanahoria (37.5 %), ajo (30 %)
Temporadas de siembra	1 temporada (37.5 % de los agricultores), 2 temporadas (45 %), más de 2 temporadas (17.5 %)
Extensión de terreno sembrado	Menos de 5 hectáreas (47.5 % de los agricultores), 5-10 hectáreas (32.5 %), más de 10 hectáreas (20 %)
Toneladas esperadas de cosecha	1-15 toneladas (6 0% de los agricultores), 16-30 toneladas (32.5 %), más de 30 toneladas (7.5 %)
Lugares de venta	Mercado Huancayo (70 % de los agricultores), mercado de Lima (25 %), mercado Chupaca (2.5 %), a mayorista en la chacra (2.5 %)
Ganancia por la venta de productos	En general, se considera que habrá ganancias en la siembra de papa, zanahoria, maíz y ajo.

Uso de fertilizantes

Los datos muestran que el fosfato diamónico es el fertilizante más empleado, con una frecuencia del 72.5 %, seguido por el cloruro de potasio (57.5 %) y el nitrato de amonio (37.5 %) (Tabla 2). Esto podría ser, tal como lo sugiere Reguera (2022), una preferencia por fertilizantes que ofrecen nutrientes esenciales como fósforo, potasio y nitrógeno, cruciales para el crecimiento y desarrollo óptimo de los cultivos en la región. Además, podría estar influenciada por la composición del suelo y las necesidades específicas de los cultivos locales, destacando la importancia de una gestión de fertilizantes adaptada a las condiciones agrícolas locales para maximizar la productividad y la sostenibilidad a largo plazo.

La papa emerge como el cultivo más favorecido por el uso de fertilizantes, con una frecuencia del 70 %, lo que subraya su preponderancia en la agricultura local; le sigue el maíz, con un 35 % de frecuencia, lo que indica su relevancia en la producción agrícola de la zona (Tabla 2). Aunque en menor medida, la zanahoria y el ajo también experimentan beneficios considerables por el uso de fertilizantes, cada uno con un 12.5 % de frecuencia. Este patrón

sugiere una distribución de fertilizantes orientada hacia los cultivos de mayor importancia económica y nutricional en la región, lo cual refleja las preferencias y las necesidades locales, tal como lo sugiere el DRA (2022).

Por otro lado, los agricultores muestran una preferencia por métodos tradicionales para mejorar la calidad del suelo, de los cuales, el volteo de la tierra es el más común, con un 50 % de frecuencia, seguido por dejar descansar el suelo por un período de tiempo, con un 42.5 % de frecuencia (Tabla 2).

La percepción de mejoras tanto en la calidad como en la producción de los cultivos debido al uso de fertilizantes es predominante entre los agricultores, con un 65 % reportando mejoras en ambos aspectos (Tabla 2). Sin embargo, un 17.5 % indicó que no observa diferencia en la producción, lo que podría señalar la necesidad de ajustes en las prácticas de fertilización o en la selección de productos. Este hallazgo resalta la importancia de evaluar continuamente las estrategias de fertilización para maximizar los beneficios en la producción agrícola, en concordancia con lo planteado por INIA (2021).

En cuanto a la toma de decisiones sobre el uso de fertilizantes, se observa una fuerte influencia de la experiencia personal de los agricultores, con un 75 % que basa sus decisiones en este factor (Tabla 2). No obstante, también es notable que un porcentaje significativo de un 27.5 % considera las recomendaciones de expertos, lo que subraya la necesidad de asesoramiento técnico para optimizar el uso de fertilizantes en la región. Asimismo, un 22.5 % toma decisiones basadas en el análisis del suelo, lo que indica una conciencia sobre la importancia de comprender las características del suelo para una fertilización efectiva, de acuerdo con lo sugeridos por DRA (2022).

Es importante resaltar que la gran mayoría de los agricultores, un 92.5 %, consideran que los fertilizantes son esenciales para el crecimiento y desarrollo de sus cultivos. Este alto grado de reconocimiento de la importancia de los fertilizantes refleja su papel crítico en la agricultura del Valle del Cunas, donde contribuyen significativamente a la productividad y sustentabilidad de los cultivos locales, conforme a lo visto en la teoría de Mankiw y Taylor (2019). Sin embargo, es importante abordar las preocupaciones del pequeño porcentaje (7.5 %) que no los considera esenciales, ya que esto podría indicar áreas donde se necesitan mejoras en la comprensión o aplicación de los fertilizantes (Tabla 2).

A continuación, se presenta la Tabla 2 con el resumen de los resultados más relevantes con respecto al uso de fertilizantes en el Valle del Cunas.

Tabla 2. Uso de fertilizantes

Ítems	Resultados
Fertilizantes utilizados con más frecuencia	Fosfato diamónico (72.5 %), cloruro de potasio (57.5 %), nitrato de amonio (37.5 %), sulfato y magnesio (22.5 %)
Cultivos que más se benefician con el uso de fertilizantes	Papa (70 %), maíz (35 %)
Método para mejorar la calidad de la tierra	Volteando la tierra (50 %), con preparado de guano (7.5 %), descansando por un periodo de tiempo (42.5 %)
Mejora por el uso de fertilizante	Sí, mejora en calidad y producción (65 %). Sí, solo en calidad (10 %). Sí, solo en producción (7.5 %). No, no hay diferencia (17.5 %)
Decisión para el uso de fertilizantes	Por experiencia (75 %), por recomendaciones de expertos (27.5 %), de acuerdo con el análisis de suelo (22.5 %), no tiene un método específico (2.5 %)
Importancia de los fertilizantes para los cultivos	Son esenciales (92.5 %), no esenciales (7.5 %)

Oferta de fertilizantes

La mayoría de los agricultores del Valle del Cunas adquiere sus fertilizantes en Chupaca (representan un 90 % de la muestra). Este dato sugiere una dependencia significativa de los proveedores locales en esta área, posiblemente debido a la proximidad y accesibilidad (Fernández, 2021). Solo un pequeño porcentaje opta por comprar en Huancayo (7.5 %) o Lima (2.5 %), lo que podría indicar una preferencia por proveedores más cercanos y prácticos (Tabla 3).

Las tiendas locales emergen como los principales proveedores de fertilizantes para los agricultores del Valle del Cunas, con el 75 % de las compras totales realizadas en estos establecimientos (Tabla 3). Esta distribución sugiere una diversidad de proveedores en el mercado de fertilizantes, es decir, demuestra que no existe un monopolio en esta área y resalta el papel vital de las tiendas locales en el suministro de insumos agrícolas para la comunidad en contraste por lo señalado por el DRA (2022).

Aunque la mayoría de los agricultores perciben un aumento en la disponibilidad de fertilizantes, con un 70 % reportando este fenómeno, aún existe una preocupación significativa sobre la disponibilidad de estos insumos, ya que el 62.5 % informa que afecta su decisión de compra. Este hallazgo sugiere que los agricultores están tomando medidas proactivas para asegurar el suministro de fertilizantes ante posibles fluctuaciones en la disponibilidad (Tabla 3).

A pesar de estos esfuerzos, el 92.5 % de los agricultores reportan enfrentar

dificultades para adquirir fertilizantes en ocasiones, lo que podría representar un desafío importante para la producción agrícola local si no se afrontan adecuadamente. La falta de acceso a estos insumos agrícolas claves puede impactar negativamente la productividad y los rendimientos de los cultivos en la región.

Es destacable que la preferencia por el uso de guano de animales sea tan alta; un 95 % de los agricultores considera este tipo de fertilizante (Tabla 3). Este dato plantea una fuerte preferencia por los fertilizantes orgánicos en la comunidad, posiblemente influenciada por consideraciones ambientales y de sostenibilidad, así como por la disponibilidad y accesibilidad de estos insumos (Mankiw & Taylor, 2019).

A continuación se presenta la tabla con el resumen de los resultados más relevantes con respecto a la oferta de fertilizantes en el Valle del Cunas.

Tabla 3. Oferta de fertilizantes

Ítems	Resultados
Donde compra los fertilizantes	Chupaca (90 %), Huancayo (7.5 %), Lima (2.5 %)
Tienda donde compra	Tiendas Mayra (30 %) Tienda Percy (20 %), tienda Yauca (15 %), tienda Mary (10 %), tienda Paty (7.5 %), otros (17.5 %)
La disponibilidad de fertilizante	Aumentó (70 %), disminuyó (7.5 %), no cambió (22.5 %)
Afectación de la disponibilidad en la decisión de compra	Compra más por anticipado (62.5 %), no afecta sus decisiones (7.5 %), reduce sus compras (25 %)
Dificultad para adquirir fertilizantes	A veces (92.5 %), nunca (7.5 %)
Consideración de uso de otro tipo de fertilizantes	Guano de animales (95 %), otros abonos naturales (5 %)

Demanda de fertilizantes

La mayoría de los agricultores consideran que el precio (51.7 %) es el factor más influyente en su decisión de comprar fertilizantes, seguido de la calidad (46.7 %) (Tabla 4). Al respecto, Garavito (2014) sugiere que, si bien la calidad sigue siendo importante, el aspecto económico tiene un peso significativo en las decisiones de compra de los agricultores. Además, un pequeño porcentaje menciona el clima y las recomendaciones como factores destacados, lo que resalta la complejidad de los factores que inciden en estas decisiones.

Es notable que la gran mayoría de los agricultores (82.5 %) consideren que vender más productos en una temporada repercute en la demanda de fertilizantes de la siguiente temporada (Tabla 4). De acuerdo con la IICA (2022), existe una relación directa entre la producción

agrícola y la demanda de insumos como fertilizantes, situación que indica la necesidad de mantener la productividad del suelo y asegurar rendimientos óptimos en las cosechas futuras.

Además, la mayoría de los agricultores (82.5 %) manifiestan que compran más fertilizantes cada temporada (Tabla 4). Lo que, de acuerdo con Reguera (2022), podría reflejar un aumento en la escala de producción o la intensificación de prácticas agrícolas que requieren un mayor uso de insumos como fertilizantes. Sin embargo, es alentador ver que algunos agricultores (12.5 %) mantienen sus compras constantes, lo cual sugiere una gestión eficiente de los insumos agrícolas.

Por último, la percepción general de un aumento en la demanda de fertilizantes por parte de la mayoría de los agricultores (80 %) es coherente con la tendencia de la compra cada vez mayor de fertilizantes cada temporada (Tabla 4). Este incremento en la demanda podría estar impulsado por diversos factores, como el crecimiento de la industria agrícola, la expansión de la superficie cultivada o la adopción de prácticas agrícolas intensivas, según lo sugerido por Mankiw y Taylor (2019).

La siguiente tabla expone el resumen de los resultados más relevantes con respecto a la demanda de fertilizantes en el Valle del Cunas.**Tabla 4.** Demanda de fertilizantes

Ítems	Resultados
Influencia para la decisión de compra	Precio (51.7 %), calidad (46.7 %), recomendaciones (8.3 %), clima (6.7 %)
Consideraciones sobre la venta de productos una temporada y su influencia en la demanda de fertilizantes de la siguiente temporada	Influye (82.5 %), no influye (17.5 %)
Compra más fertilizante cada temporada	Compro más (82.5 %), compro igual (12.5 %), compro menos (5 %)
Consideraciones sobre la demanda (la intención de compra) de fertilizantes	Aumento (80 %), no cambio (12.5 %), disminuyó (7.5 %)

Políticas arancelarias agrícolas, expectativas futuras y condiciones climáticas

El 70 % de los agricultores consideran que las políticas de gobierno o programas de apoyo influyen en la demanda de fertilizantes. Esta percepción sugiere que las políticas gubernamentales relacionadas con la agricultura, como subsidios o incentivos, pueden influir en las decisiones de compra de los agricultores, ya sea aumentando o disminuyendo la demanda de fertilizantes, lo que concuerda con información de la FAO (2022b). La existencia de un porcentaje significativo (30 %) que no percibe esta influencia indica una diver-

sidad de opiniones y posiblemente una falta de claridad sobre el impacto real de estas políticas (Tabla 5).

En cuanto a las expectativas de futuros precios, la gran mayoría de los agricultores (65 %) esperan un aumento en los precios de los fertilizantes. Esta expectativa puede deberse a factores como el aumento de la demanda global de fertilizantes, la escasez de materias primas o los cambios en las políticas comerciales (Reguera, 2022). Sin embargo, es importante destacar que una proporción significativa de agricultores (12.5 %) no están seguros sobre el futuro de los precios, lo que refleja la incertidumbre en el mercado de fertilizantes y la necesidad de monitorear de cerca su evolución (Tabla 5).

Además, la mayoría de los agricultores (92.5 %) consideran que los cambios en las condiciones climáticas influyen en la compra de fertilizantes (Tabla 5). Esto sugiere una fuerte conciencia entre los agricultores sobre la interacción entre el clima y la productividad agrícola, así como la necesidad de adaptarse a estos cambios mediante el uso adecuado de fertilizantes (Garavito, 2014). Además, se puede inferir que los agricultores están explorando diversas estrategias para hacer frente a estos cambios, como emplear otro tipo de fertilizante, aumentar la cantidad de fertilizantes aplicados y utilizar fertilizantes orgánicos. Esto resalta la importancia de la adaptación y la resiliencia en la agricultura frente a los desafíos climáticos.

La siguiente tabla presenta el resumen de los resultados más relevantes con respecto a las políticas arancelarias agrícolas, expectativas futuras y condiciones climáticas en el Valle del Cunas.

Tabla 5. Políticas arancelarias agrícolas, expectativas futuras y condiciones climáticas

Ítems	Resultados
Consideraciones sobre las políticas de gobierno o programas de apoyo y su influencia en la demanda (o compra) de fertilizantes	Influye: se puede comprar más o menos (70 %), no influye (30 %)
Expectativa sobre los precios de los fertilizantes en el futuro	Aumentará (65 %), disminuirá (10 %), permanecerá igual (12.5 %), no está seguro (12.5 %)
Consideración sobre los cambios en las condiciones climáticas y su influencia en la compra de fertilizantes	Influye (92.5 %), no influye (7.5 %), cambiar de tipo de fertilizante (41.7 %), aumentar la cantidad de fertilizantes (25 %), usar fertilizantes orgánicos (10.4 %)

Análisis general

Los resultados señalan la participación de 40 agricultores en la recopilación de datos. Es importante destacar que esta muestra representa una parte significativa de la comunidad agrícola local y brinda una base sólida para el análisis.

Además, al considerar que los agricultores locales enfrentan diversos desafíos, es fundamental contar con una muestra representativa para entender sus prácticas y necesidades.

En cuanto a los cultivos principales, la papa y el maíz se destacan por su importancia en la economía agrícola local. Los datos muestran que el 90 % de los agricultores consideran la papa como su cultivo principal, seguido por el maíz con el 57.5 %. Estos hallazgos son consistentes con la investigación previa realizada por MINAGRI (2021), que identificó la papa y el maíz como cultivos estratégicos en la región debido a su alto rendimiento y demanda en el mercado. Además, la presencia de cultivos adicionales como la zanahoria y el ajo evidencia la diversificación de la producción agrícola y la capacidad de adaptación de los agricultores a las demandas del mercado, lo cual es crucial para la sostenibilidad y la resiliencia económica de la región (DRA, 2022).

La distribución de los agricultores entre una y dos temporadas de siembra refleja una estrategia diversificada de producción y una adaptación a las condiciones del mercado y los cambios en los precios de los fertilizantes. Hay que resaltar que esta estrategia diversificada puede ayudar a mitigar los riesgos asociados con la dependencia de una sola temporada de siembra y a maximizar la producción agrícola en la región. Este hallazgo es consistente con lo planteado por Gertler et al. (2017), quienes argumentan que la diversificación de las temporadas de siembra permite a los agricultores reducir la vulnerabilidad frente a variaciones climáticas y de mercado.

En términos de escala de producción, la mayoría de los agricultores operan en una escala relativamente pequeña, con menos de 5 hectáreas de terreno sembrado. Este hallazgo subraya la predominancia de agricultores de pequeña escala en la región y resalta los posibles desafíos que enfrentan estos agricultores, especialmente en lo que respecta a la rentabilidad y la capacidad para absorber aumentos de costos, como los asociados con los fertilizantes. Los estudios de MINAGRI (2022) sugieren que los pequeños agricultores suelen enfrentar mayores dificultades para acceder a insumos de calidad y a precios competitivos, lo cual puede afectar su productividad y sostenibilidad.

El análisis del uso de fertilizantes revela patrones interesantes en cuanto a los tipos de fertilizantes más utilizados y su impacto en diferentes cultivos. El fosfato diamónico emerge como el fertilizante más empleado, seguido por el cloruro de potasio y el nitrato de amonio, lo que refleja una preferencia por los nutrientes esenciales para el crecimiento de los cultivos. Además, la percepción general de mejoras en la calidad y producción de los cultivos debido al uso de fertilizantes resalta su importancia en la agricultura local. Según estudios de IICA (2022), el uso adecuado de fertilizantes puede

incrementar significativamente el rendimiento de los cultivos, aunque también se requiere una correcta dosificación y aplicación para evitar problemas ambientales.

En términos de la oferta y la demanda de fertilizantes, es importante destacar la dependencia significativa de los proveedores locales en la adquisición de estos insumos. La mayoría de los agricultores adquieren sus fertilizantes en Chupaca, lo que sugiere una fuerte conexión entre los agricultores locales y los proveedores regionales. Sin embargo, la preocupación por la disponibilidad de fertilizantes y las dificultades para adquirirlos en ocasiones indican desafíos importantes que enfrentan los agricultores en la región. Según INIA (2021), los problemas de distribución y acceso a fertilizantes pueden afectar negativamente la productividad agrícola y la estabilidad económica de los agricultores.

Finalmente, es esencial destacar la percepción de los agricultores sobre factores externos, como las políticas gubernamentales, las condiciones climáticas y las expectativas de precios futuros, y cómo estos influyen en sus decisiones de compra y producción. La conciencia sobre estos factores y la adaptación de los agricultores a ellos son aspectos fundamentales para garantizar la sostenibilidad y el desarrollo continuo del sector agrícola en el Valle del Cunas. Según Fernández (2021), las políticas agrícolas desempeñan un papel crucial en la configuración del panorama agrícola, y su adecuado diseño e implementación pueden mejorar significativamente la resiliencia y competitividad de los agricultores locales.

Así pues, los resultados de este estudio proporcionan una visión detallada de las prácticas agrícolas en el Valle del Cunas, que destaca la importancia de los fertilizantes, las estrategias de diversificación, y los desafíos enfrentados por los agricultores de pequeña escala. La integración de estos hallazgos con los antecedentes y trabajos previos proporciona una base sólida para desarrollar políticas y estrategias que mejoren la productividad y sostenibilidad de la agricultura en la región.

CONCLUSIONES

La investigación destaca la dependencia de los agricultores del Valle del Cunas respecto al uso de fertilizantes, fundamentales para la productividad agrícola en la región. Se subraya la complejidad de los factores que inciden en las decisiones agrícolas, desde consideraciones económicas y climáticas hasta políticas gubernamentales. La necesidad apremiante de políticas que garanticen un acceso equitativo a los fertilizantes y promuevan prácticas agrícolas sostenibles emerge como una prioridad evidente. En este contexto, comprender la percepción de los agricultores acerca del aumento de los precios de los fertilizantes se erige como un paso fundamental para informar políticas

y programas destinados a impulsar un desarrollo agrícola sólido y sostenible en el Valle del Cunas y áreas similares.

La producción agrícola en el Valle del Cunas está predominantemente centrada en cultivos como la papa y el maíz, que representan el 90 y el 57.5 % de los agricultores respectivamente. Esta concentración en cultivos específicos refuerza la necesidad de estrategias y políticas que apoyen estos sectores cruciales. La diversificación observada con cultivos adicionales como la zanahoria y el ajo sugiere una capacidad de adaptación a las demandas del mercado, lo que es vital para la resiliencia económica de la región.

Datos adicionales revelan que el 47.5 % de los agricultores operan en una escala de menos de 5 hectáreas de terreno sembrado, hecho que destaca la predominancia de agricultores de pequeña escala en la región. Esta distribución sugiere una estructura agrícola diversa, pero con una significativa presencia de agricultores de pequeña y mediana escala, lo que subraya la importancia de políticas específicas de apoyo para este segmento. Los agricultores de pequeña escala enfrentan desafíos únicos, incluyendo la rentabilidad y la capacidad para absorber aumentos de costos, por lo que un enfoque político sensible a estas necesidades es crucial.

Los datos muestran que el fosfato diamónico es el fertilizante más empleado, con una frecuencia del 72.5 %, seguido por el cloruro de potasio (57.5 %) y el nitrato de amonio (37.5 %). Además, el 65 % de los agricultores reportan mejoras tanto en la calidad como en la producción de los cultivos debido al uso de fertilizantes. Estos números resaltan la importancia y efectividad percibida de los fertilizantes en la producción agrícola local. Es fundamental promover el uso adecuado de fertilizantes para maximizar estos beneficios y minimizar los impactos ambientales negativos.

El 90 % de los agricultores del Valle del Cunas adquieren sus fertilizantes en Chupaca, lo que refleja una fuerte dependencia de los proveedores locales en esta área. A pesar de que el 70 % reporta un aumento en la disponibilidad de fertilizantes, el 92.5 % enfrenta dificultades para adquirirlos en ocasiones, lo que subraya la importancia de abordar los desafíos relacionados con la disponibilidad y accesibilidad de estos insumos. Mejorar la infraestructura de distribución y la logística puede ser una medida efectiva para garantizar un suministro constante y equitativo de fertilizantes.

La mayoría de los agricultores (82.5 %) consideran que vender más productos en una temporada influye en la demanda de fertilizantes en la siguiente temporada. Además, el 80 % percibe un aumento en la demanda de fertilizantes, lo que indica una tendencia creciente en la necesidad de estos insumos para

mantener y mejorar la producción agrícola. Este aumento en la demanda sugiere la necesidad de asegurar un suministro adecuado y accesible de fertilizantes para satisfacer las necesidades de los agricultores.

El 70 % de los agricultores perciben que las políticas de gobierno o programas de apoyo influyen en la demanda de fertilizantes. Sin embargo, existe una diversidad de opiniones sobre el impacto real de estas políticas, situación que destaca la necesidad de evaluar y ajustar adecuadamente las políticas agrícolas para satisfacer las necesidades y demandas de los agricultores. Las políticas efectivas deben ser informadas por las percepciones y experiencias de los agricultores para ser verdaderamente útiles y eficaces en el apoyo a la agricultura local.

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Declaración de conflictos de intereses

Las autoras declaran no tener ningún conflicto de intereses, potencial o evidente, con ninguna entidad o individuo que pueda influir en la presentación de resultados de la presente investigación.

Contribución de los autores

Sol Valeria Vicente-Solano: redacción, borrador original. Margarita Elluz Calle-Arancibia: redacción, revision y edición.

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Informal settlements in Colombia: A look at the city of Tunja (2010-2022)

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Abstract: This paper presents a comprehensive analysis of informal settlements in Tunja, Colombia, from 2010 to 2022. It examines the historical, social, and economic factors that contribute to these settlements, using various data sources, including development and territorial planning plans, the Agustín Codazzi Geographic Institute, and local government records. The study highlights significant inequalities in access to public services between urban and rural areas, exacerbated by environmental hazards from nearby mines, landfills, and sewage treatment plants.

The research employs a descriptive and explanatory approach, detailing the historical context and theoretical frameworks related to agglomeration economics, territorial inequality, and urbanization processes. A historical-deductive method ensures logical consistency in the analysis of data from 2010 to 2022. The study also utilizes georeferencing techniques to present spatial data on service coverage and demographic characteristics, differentiating urban and rural disparities.

Findings show that informal settlements in Tunja are predominantly located on the periphery of the city, with significant disparities in service coverage. While urban areas have over 90% coverage of basic services, rural areas lack adequate infrastructure, particularly sewage, gas, and internet services. The study identifies specific settlements, such as Runta and Pirgua, details their access to services and highlights environmental and structural issues.

Keywords: inequality, settlements, city, rural area, public service, Colombia.

JEL classification: I38, O18, R11, R21, R23.

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Asentamientos informales en Colombia: una mirada a la ciudad de Tunja (2010-2022)

Resumen: Este artículo presenta un análisis integral de los asentamientos informales en la ciudad de Tunja, Colombia, desde 2010 hasta 2022. Explora factores históricos, sociales y económicos que contribuyen a estos asentamientos, utilizando una variedad de fuentes de datos, que incluyen planes de desarrollo y ordenamiento territorial, el Instituto Geográfico Agustín Codazzi y registros del gobierno local. El estudio destaca desigualdades significativas en el acceso a servicios públicos entre áreas urbanas y rurales, exacerbadas por peligros ambientales de la minería cercana, vertederos y plantas de tratamiento de aguas residuales. La investigación emplea un enfoque descriptivo y explicativo, que detalla el contexto histórico y los marcos teóricos relacionados con la economía de aglomeración, la desigualdad territorial y los procesos de urbanización. Un método histórico-deductivo asegura la coherencia lógica en el análisis de los datos de 2010 a 2022. El estudio también utiliza técnicas de georreferenciación para presentar datos espaciales sobre la cobertura de servicios y características demográficas, diferenciando las disparidades entre lo urbano y lo rural. Los hallazgos revelan que los asentamientos informales en Tunja están predominantemente ubicados en la periferia de la ciudad, con disparidades significativas en la cobertura de servicios. Mientras que las áreas urbanas muestran una cobertura superior al 90 % para los servicios básicos, las áreas rurales carecen de infraestructura adecuada, especialmente en servicios de alcantarillado, gas e internet. El estudio identifica asentamientos específicos como Runta y Pirgua, puntualiza su acceso a servicios y destaca problemas ambientales y estructurales.

Palabras clave: desigualdad, asentamientos, ciudad, zona rural, servicios públicos, Colombia.

INTRODUCTION

The Colombian Constitution recognizes that all Colombians have the right to adequate housing, and that, in addition, this right must be fulfilled through government policies such as housing programs and plans (Constitución Política de Colombia, 1991, art.51) that guarantee this right to its citizens. According to the Constitutional Court, the condition of adequate housing is determined by the elements of dignity and security, therefore, the existence of informal settlements requires government intervention in accordance with the provisions of the Constitution. For UN-Habitat (2018), informal settlements are poor neighborhoods or slums that are in situations of overcrowding and illegality because those who inhabit these territories do not have any legal right over them, that is, they do not have this right. Likewise, land is the refuge of people in poverty who do not have access to decent housing and influence the development of a country by affecting the quality of life of the people who live there (Wekesa et al., 2011).

In Colombia, urban development has brought with it not only their modernization but also the growth of marginal neighborhoods, which were mostly located in areas of environmental risk (Uribe, 2011). In Tunja, Municipal Agreement No. 0014 of 2001 (Concejo Municipal de Tunja, 2001) recognizes the existence of houses on risky land and illegal urban development processes, especially in the existing gullies for that year. The presence of informal settlements reflects gaps in territorial planning, since an informal settlement is not only due to the illegality of the land but also to the lack of basic services. In addition, some of these settlements are located in environmentally hazardous areas which increases the risk faced by the population living in these areas.

The objective of this document is twofold: firstly, to indicate the main historical aspects associated with the existence of informal settlements in Colombia; secondly, to contextualize the socioeconomic conditions of the informal settlements of Tunja, with a view to contributing to the process of recognition of these territories, especia-

lly in the rural area, given the evident low quality of life and the dangers faced by its population on a daily basis.

This work is divided into the following sections: the first comprises the introduction, the second a conceptual description related to space as an object of study and territorial inequality is made, the third the applied methodology, the next includes historical aspects of Colombia related to the existence of informal settlements, the fifth details the population, habitation and demographic characteristics of the city of Tunja, and finally the conclusions are related.

THEORETICAL CONCEPTUAL REVIEW

Space as an Object of Study

In examining the concept of space according to Polèse and Rubiera (2009) from an economic perspective, it becomes evident that the notion of space can be understood through the lens of related concepts such as territory, environment, region, and country. Furthermore, the concept of space can be understood from a social perspective, with theoretical, geometric, or mathematical notions being referenced. Nevertheless, in the analysis of these authors, the term "geographical space" stands out, which refers to lived, real, or terrestrial space. In other words, the concept of space can be understood in a variety of ways, depending on the context in which it is being discussed. Consequently, defining it with precision can be challenging, as it may be associated with a range of similar terms, depending on the object of study or the environment in question.

Similarly, for Andion et al. (2009) the concept of space seen from the perspective of economic development takes the notion of territory, which cannot be seen as a static concept limited by geographical or administrative terms, on the contrary, it is a concept that varies according to the case analyzed. That is, space can take on different forms depending on the context, region or reality to which it belongs. Moreover, they affirm that this concept became relevant after the Second World War due to the territorial imbalances caused, which motivated economists and geographers to take an interest in this field of study.

The inclusion of the spatial dimension in economics is discussed by Isard (1949) by criticizing of authors such as Hicks, Mosak, Lange and Samuelson, who exclude space as an object of study. On the contrary, Isard sees in the spatial economics as a theory that understands economics as a whole. The first generation of authors on location theories were Von Thunen, Christaller and Zipt, who each developed their models and contributed to the foundations of spatial economics (Haggett et al., 1967). In 1826 the work of the economist Von Thünen was published, where he developed a spatial economic model based on rural development, this model divided economic and agricultural activities

according to the economic performance of each one (Sasaki & Box, 2003).

Furthermore, the significance of geography within the spatial economy is acknowledged (Buzai & Baxendale, 2010). Geography is defined as the scientific study of territorial planning, encompassing methodologies, knowledge, and tools such as statistics, geographic information systems, cartography, and others. As posited by Bonet (2007), economic geography, as an area of economic theory, only began to gain relevance in recent years. This field of study concerns the analysis of the geographical distribution of economic and social activities. In other words, it seeks to understand the factors that influence the concentration of economic and social activities in specific locations within a territory.

In 1999, the term New Economic Geography, proposed by Masahisa Fujita, Paul Krugman and Anthony Venables, was introduced to the academic community to underscore the contributions made to regional economies since the 1990s (Trívez, 2004). In their commentary, Fujita and Krugman (2004) address the following:

The issue to highlight in the new economic geography is that it tries to provide some explanation for the formation of a great diversity of forms of economic agglomeration (or concentration) in geographical spaces. The agglomeration or clustering of economic activity takes place at different geographic levels and has a variety of different forms. Taking an example, a certain type of agglomeration arises with the grouping of small shops and restaurants in a neighborhood. We find another type of agglomerations in the process of formation of cities, where they all acquire different sizes, (…) in the emergence of a variety of industrial districts; or in the existence of strong regional inequalities within a country. (p. 179)

In other words, taking into account the agglomeration of economic elements, phenomena such as the formation of cities, the unequal distribution of wealth, the concentration of poverty, among others, can be explained. Polèse and Rubiera (2009) highlight the importance of the historical processes of cities and countries in the study of space, since they allow comparative analyzes through the processes of industrialization, development and urbanization which affect consumption structures, wealth distribution of, employment opportunities, market systems and planning.

Territorial Inequality and Territorial Settlements

According to ECLAC (2016), inequality explains that the structuring axes of inequalities are related to inequality of income, means, gender, access to productive means, ethnic-racial and territorial. Territorial inequality is

understood as the difference in the distribution of resources, which have a surplus and excessive spending in rich countries or territories, as opposed to poor countries or territories, where these resources have a significant deficit (George, 1983), that is, territorial inequality is related to the level of development of countries and their management of resources.

However, this structuring axis is also manifested through access to services such as health, education, quality infrastructure, drinking water equipment, sanitation and transportation. Similarly, it is manifested through social, physical, and symbolic relationships and cultural aspects that exist with the territory. This relationship can reinforce positive or discriminatory facets with the place of origin or residence (ECLAC, 2021).

According to Cazzuffi (2017), Territorial inequalities particularly affect people living in the poorest areas, impacting on aspects such as access to quality employment, education and health. Moreover, differences in climatic, security, and demographic conditions, among others, imply sectoral gaps within the same territory (neighborhood, city, department, country). For this reason, the territory is part of the structural study of inequality, because its conditions influence the social development of people who live in the most backward spaces (Czytajlo, 2017).

In Latin America, the urban areas of the cities are those that concentrate the economic, political and administrative power due to rapid urbanization that did not have prior planning, consequently, the cities of Latin America present high levels of inequality, environmental degradation and weak economies (ECLAC, 2017 2021). In fact, the case of Colombia shows that one of the factors that increases in inequality is land ownership due to its unequal distribution (Cárdenas & Vallejo, 2016).

The dictionary of the Royal Spanish Academy defines settlements as uninhabited areas, places or facilities that are occupied by displaced persons or migrants. The cause of informality can be attributed to factors such as low income levels, unrealistic urban planning, few plots of land with access to public services and a dysfunctional legal system. Likewise, the consequences of this informality are reflected in the high costs to those who live in these settlements, the lack of public services, social segregation, environmental and health hazards, and inequitable civil rights (Fernandes, 2011).

The term "informal settlements" is recognized with different names in various countries or territories, as documented by Davis (2006) and Romero (2019). These include favelas in Brazil, slums in Buenos Aires, lost cities in Mexico City, communes in Colombia, callampa towns or shanty camps in Chile, and pigeon marshes

in Montevideo, among others. In this regard, Vázquez (2019) assures that the informality of the settlements generates problems in the quality of life of the inhabitants due to the difficulty of bringing basic services and decent housing to illegal areas or outside the urban planning regulations. In other words, living in an informal settlement implies not only difficult access to public services, but also zero access to urban infrastructure, telecommunications, and the condition of invisibility that these residents face due to exclusion. social due to its informality (Techo Latam, 2021).

In Colombia, as stipulated by Law 2044 of 2020, settlements can be classified as either consolidated illegal human settlements or precarious illegal human settlements. This classification is based on the condition of the housing in terms of materials, access to services, and level of development. It should be noted that the term "illegal consolidated" is used to describe settlements that, despite being located in an unauthorized area, have reached a relatively advanced level of development. This is evidenced by the presence of consolidated housing with stable materials and access to paved roads. In contrast, the second category encompasses settlements that lack both consolidated and developed urban planning. Nevertheless, both categories are characterized by an unplanned, unauthorized, and illicit location of these residences (Law 2044 of 2020).

METHODOLOGY

To characterize the informal settlements in Tunja, the descriptive method is used since it begins by detailing the historical context and theoretical concepts related to the agglomeration economy, territorial inequality and urbanization processes. Likewise, the type of explanatory study is used to respond to the causes of the phenomenon studied, in this case, the informal settlements in Tunja.

The selected period is from the year 2010 to the year 2022, which was chosen based on the data and available bibliography. Likewise, the historical-deductive method is used to achieve logical consistency through the search and obtain data on informal settlements in Colombia and mainly in Tunja. For this purpose, sources of information such as municipal and national development plans and territorial planning plans, the Geographic Institute Agustín Codazzi, and academic production related to the research topic are taken into account. The above sources will be key not only for the characterization of the settlements but also for the city of Tunja and its socio-economic conditions, which is why it is intended to identify the conditions of housing and access to public housing services.

Additionally, a georeferencing methodology based on the 2021 data from the Tunja Mayor's Office is applied to

the ArcGIS tool from which spatial data from providers such as Tomtom, Garmin, Fourquare and METI/NASA are also integrated to present the data in geospatial form and to include layers that allow the insertion of roads, routes, and other data in satellite form.

Therefore, the socio-economic representation of the urban area of Tunja is made through the application of georeferencing systems that allow differentiating the coverage of basic services and the educational level of the inhabitants according to the neighborhood in which they live. To observe this difference, the layer of neighborhoods in the urban area of Tunja was used with a total of 158 polygons representing each of the neighborhoods. With this methodology, the disparity between neighborhoods is known and therefore additional results can be obtained not only on the inequality between the rural and urban areas of the municipality but also on the disparity between the areas of the capital. The interpretation of the spatialized data is obtained by identifying the tone assigned to each level of service coverage in order to know the proportion of properties according to each neighborhood that do or do not have services such as water and electricity.

THE EXISTENCE OF INFORMAL SETTLEMENTS IN COLOMBIA

Regarding the history of Colombia, there are elements that have marked the country's memory, among them: drug trafficking and the birth of guerrillas, these two factors, according to Unidad de Paz (2000), these elements have caused situations of increased violence, increase in armed conflict, weakening of public institutions, and corruption. Also, one of the problems that characterizes Colombia is forced displacement and land appropriation.

According to the Unidad para las Víctimas (2023), among the events or conflicts that affect the Colombian population are: forced displacement, forced disappearance, abandonment or forced dispossession of land, threat, terrorist act, attacks, antipersonnel mine, kidnapping and homicide, with Bogotá and Medellín being the cities with the greatest reception of displaced population (Londoño Toro, 2004), likewise, Pérez and Córdoba (2019) say that the displaced population is accentuated in residual spaces on the periphery of the cities, creating an "informal invasion."

That is, displacement is a cause of the emergence of informal settlements in Colombia, since it forces people, families and communities to locate in new cities, places and territories, therefore, forced displacement would act in this case as a sociodemographic phenomenon. that influences the urbanization and growth of cities (Gómez, 2010), such as Bogotá and Medellín. Figure 1 shows the percentage of Colombia's urban population living in informal settlements also known as slums.

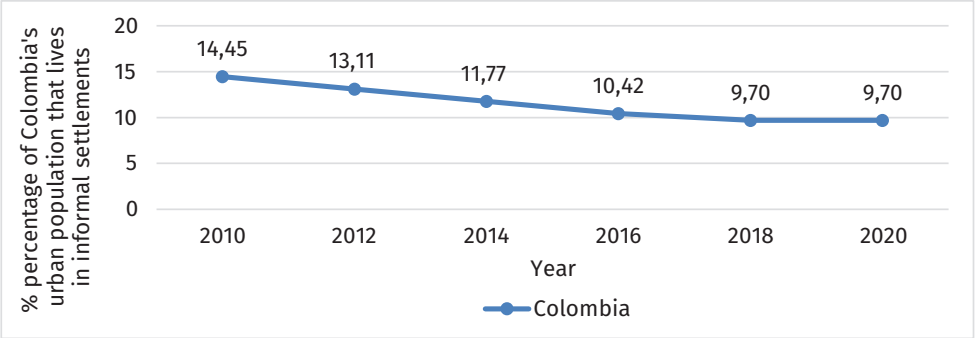

Figure 1. Percentage of Colombia's urban population living in slums, period 2010 to 2020.

Source: prepared by the authors with figures from the World Bank (2023).

By 2016, Bogotá had 125 informal settlements located in the periphery, where the presence of a population displaced by the armed conflict is recognized (Techo Colombia, 2016). In the case of Medellín, it is clear that it not only presents the condition of receiving of displaced people who settle in its territory, if not also, the expulsion of the population due to violence (Gómez, 2010).

The figures (2 and 3) below refer to the most urgent needs and the main problems of informal settlements in Bogotá for the year 2015, which reflects that the inhabitants of these settlements must not only face their condition of displacement by violence, but also areas of social conflicts such as drug trafficking and theft, in addition to limitations in security and access to basic services.

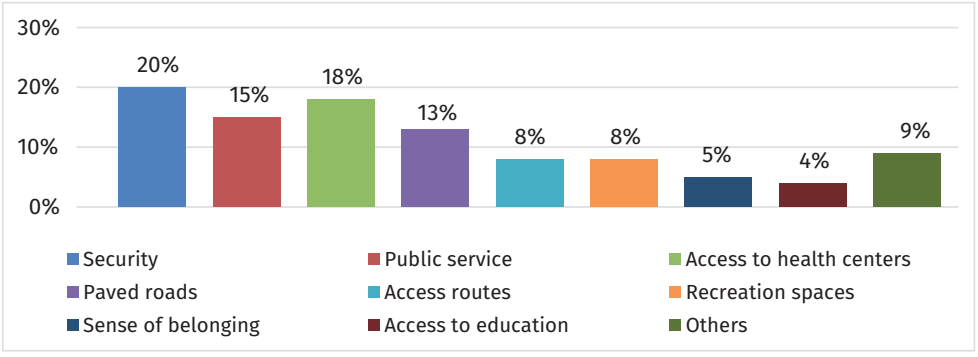

Figure 2. Most urgent needs of informal settlements in Bogotá, 2015

Source: prepared by the authors with figures from Techo Colombia (2016).

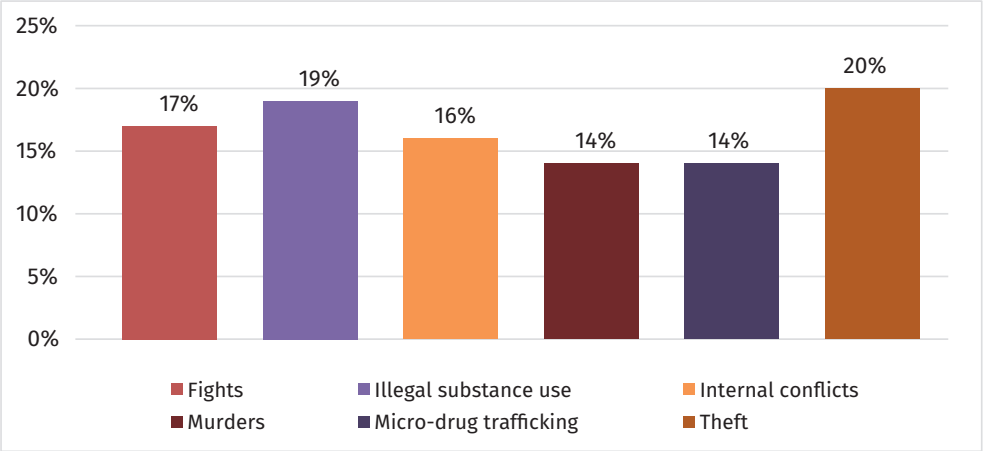

Figure 3. Main social problems of informal settlements in Bogotá, 2015

Source: prepared by the authors with figures from TECHO (2016).

Among the Colombian cities with experience of intervention in settlements is Medellín, where in 1999, with the first Territorial Planning Plan, instruments such as Urban Regularization and Legalization Plans were used, which did not meet expectations since it was found that processes were clearly generated for the legalization of property, without benefiting the informal settlements, since there was no improvement of roads or provision of social and community facilities; on the contrary, it was a process that favored only the administration, as with the legalization of properties, higher taxes had to be paid (Velásquez-Castañeda, 2013).

In 2004, however, the Integral Urban Projects arrived in Medellín with the aim of planning and intervening in marginalized, segregated areas, and affected by poverty and violence. This strategy has led to processes of neighborhood consolidation where communes have been equipped with parks, streets and pedestrian bridges that connected neighborhoods and communities that had been divided by violence; access to primary and secondary education has also been improved, and cultural and sports projects, among others, have been supported (Echeverri & Orsini, 2010).

On the other hand, the concept of settlement in the case of Tunja is evoked for the pre-Columbian and conquest era, where the presence of indigenous communities is recognized. These communities were located in the Cundiboyacense highlands where they were favored by the water bodies, mountains and hills of the region (Portilla Tarazona, 2021). As Francis (2002) indicates, the time of the con-

quest had a serious impact to these settlements, as the population went from around 230,000 indigenous people at the beginning of the conquest to 47,554 in the 17th century, and 25,000 in the 18th century.

Likewise, the conquest of America brought with it diseases such as smallpox, measles, influenza, bubonic plague, yellow fever and cholera, which also affected the indigenous population, who had no immunity to these evils. The impact of these diseases was such that smallpox is associated with the birth of an informal settlement in the San Lázaro neighborhood of Tunja, since it was a sector far from the capital where they could leave the sick and, failing that, reject them (Hidalgo, 2012a).

DEMOGRAPHIC, GEOGRAPHIC, AND HABITATION CHARACTERISTICS OF THE CITY OF TUNJA

The demographic dynamics of the city reflect some changes in the last 13 years, given that there is a preference of the population toward the urban area of the city, which has been increasing in the last 23 years, however, this growth in the capital is contrary to the crude birth rate due to a drop in the number of births starting in 2015, leaving a natural growth rate with a negative slope.

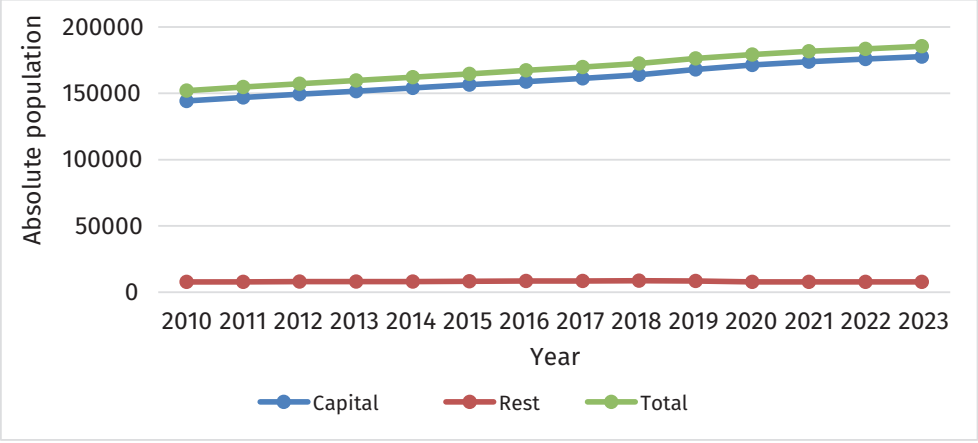

Figure 4. Absolute population of the capital, rest and total of the city of Tunja (2010-2023)

Source: prepared by the authors with figures from DANE (2023)

However, the population growth in the capital of Tunja is the result of the migratory growth rate where, starting in 2014, an increase in said population is reflected, reaching its peak in 2019, with the results of the following three years being uncertain without the consequences of the COVID-19 pandemic.

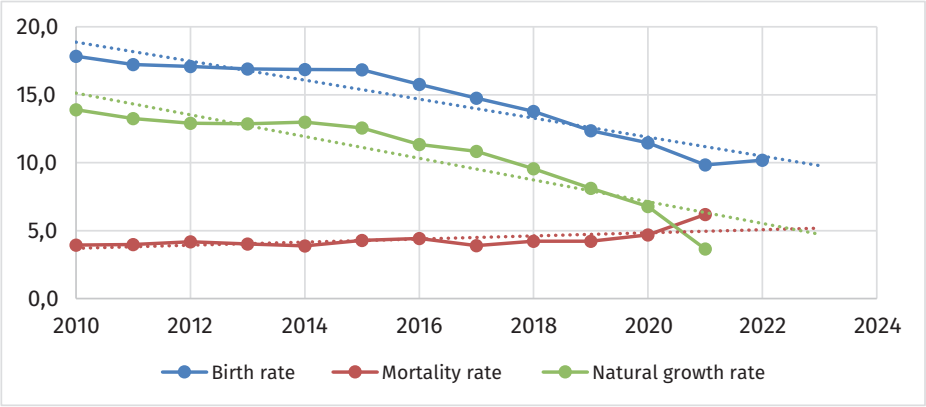

Figure 5. Birth, mortality and natural growth rate of the city of Tunja (2010-2023)

Source: prepared by the authors with figures from DANE (2023)

According to data from DANE (2018), in Tunja for the year 2018, the largest number of migrants from municipalities in Colombia came from Duitama, Sogamoso, Bucaramanga, Bogotá, Medellín, Barranquilla, among others; likewise, the largest number of migrants from another country were of Venezuelan, Ecuadorian, American and Spanish origin. However, although one of the causes of the existence of informal settlements in Colombia is forced displacement, there is no record of the place of residence of these migrants, nor of the place of birth of the people who have settled in these spaces.

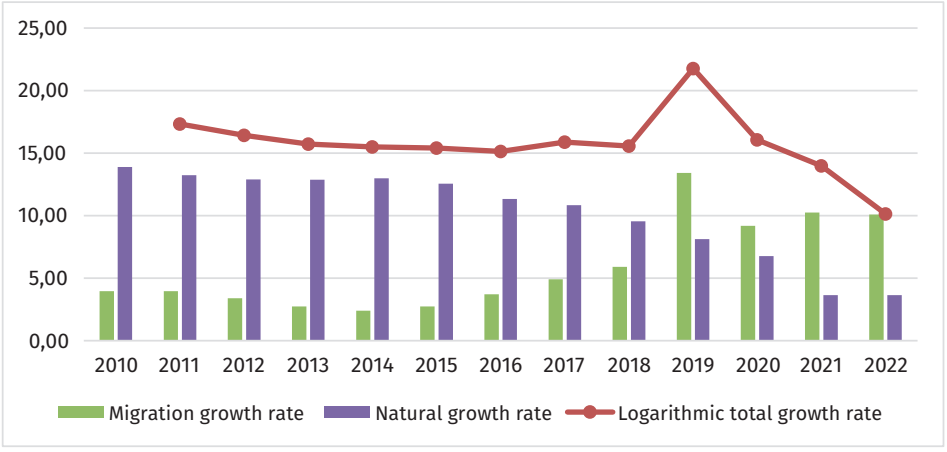

Figure 6. Total, natural and migration growth rates of the city of Tunja (2010-2022)

Source: prepared by the authors with figures from DANE (2023)

Hidalgo (2012b) points out that since 1907, marginal type constructions have been recorded in the city, which are part of the informal constructions that spread throughout the 20th century until 2005 (Appendix 1), these marginal type constructions appeard in different areas of the city, mainly in the neighborhoods of San Lázaro, Libertador, Patriotas, Triunfo, Milagro, Altamira, Dorado, Asís, La Granja, Gaitán, Carmen, Nazaret and Santa Lucía, which belong to the urban area. In this regard, the land occupation in Tunja is significant for the type of informal urban structure; however, Hidalgo (2012a) recognizes informal housing as housing that has not been planned in advance, but is also housing in precarious conditions.

On the other hand, the Town Hall of Tunja (Alcaldía Mayor de Tunja, 2021) establishes that the percentage of illegal neighborhoods in the city makes up more than 90% of the land; however, this percentage is determined by the legal conditions under which the neighborhoods were built but not by their socioeconomic conditions or by compliance or non-compliance with urban planning regulations.

Table 1. Neighborhoods legalized according to municipal agreement until 2020

Neighborhood	Municipal agreement	Year
Diez y Siete de Diciembre	Agreement 032 of December 1	1930
Obrero	Agreement 15 of November 7	1955
Barrio al Norte	Agreement 11 of January 30	1969
El Triunfo	Agreement 006 of December 10	1972
La Trinidad	Agreement 05 0f January 29	1973
20 de Julio	Agreement 20 of October 1	1973
Pozo de Donato	Agreement 08 of September 01	1978
Nazaret	Agreement 069 of February 11	1982
Los Mártires	Agreement 072 of February 11	1982
San Carlos	Agreement 28 of February 11	1983
Santiago de Tunja	Agreement 18 of November 29	1984
Santa Bárbara	Agreement 10 of May 9	1985
José Antonio Galán	Agreement 17 of December 2	1985
Tunjuelito	Agreement 30 of November 28	1989
Lanceros	Agreement 007 June 7	1990
La Concepción	Agreement 50 of December 4	1996
La Frontera	Agreement 011 of May 26	1999
Portal del Curubal	Agreement 015 of July 12	1999
Villa del Norte	Agreement 004 of March 21	2000

Source: Alcaldía Mayor de Tunja (2021a)

Regarding the coverage of service in Tunja, Table 2 shows that in 2005 more than 50% of the city had all basic services, although there were only 18 legalized neighborhoods, i.e., their informal status did not affect the provision of basic services which shows that despite being an illegal city, not all of its neighborhoods are marginalized; however, these data do not distinguish between the rural area and the urban area of the city.

Table 2. Percentage of coverage of basic services in the city of Tunja, year 2005

Public services	Coverage
Energy service	99.60%
Aqueduct	98.90%
Sewer	95.90%
Gas	91.40%
Garbage collection	96%
Internet	58.40%

Source: Prepared by the authors with figures taken from DANE (2005)

For the year 2018, the data are presented in Table 3, which shows the disparity in access to services between the rural area and the urban area of the city, mainly between sewerage, gas, Internet and garbage collection services, with the rural area being the one with the greatest lack of services, especially gas and Internet service. Likewise, Table 4 shows the water used by the inhabitants of Tunja go to prepare their food, showing that although the public aqueduct is the most common source, there are still cases of using sources that are not healthy and safe for health.

The maps provided (Figure 7) illustrate the areas of Tunja according to the availability of basic services such as electricity and water. In the electricity map, neighborhoods with fewer properties served by electricity are shown in red, primarily located on the outskirts, while areas with greater coverage are shown in yellow in the center. Similarly, the water map shows that neighborhoods in the peripheral zones, shown in dark blue, have less access to water services than the more central areas, shown in light blue. These maps highlight the disparities in basic infrastructure and suggest a concentration of services in the more developed and central areas of the city, while the outskirts face significant limitations in accessing essential resources.

This analysis of the distribution of basic services in Tunja raises important questions about urban equity and planning. The clear division between the central areas and the outskirts suggests that there may be a need to review and adjust urban planning policies to ensure that basic services, so essential to quality of life, are distributed more equitably. Infrastructure development should focus not only on meeting the needs of densely populated and economically active areas but also on improving conditions in less developed areas. This is critical to promoting more inclusive and sustainable urban growth that benefits all city residents, regardless of their geographic location.

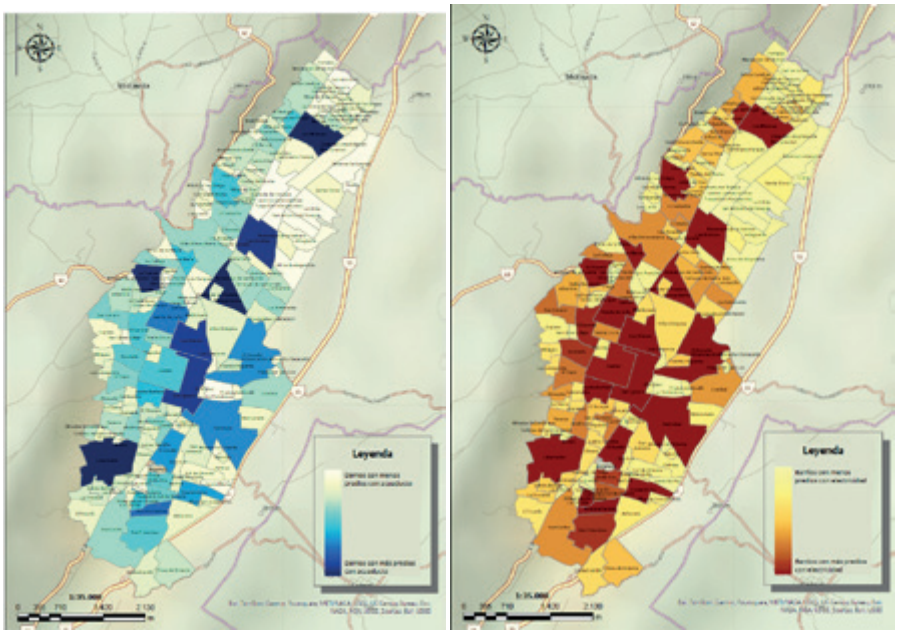

Figure 7. Maps of neighborhoods in Tunja with water and energy services

Source: prepared by the authors with data from the Town Hall of Tunja (Alcaldía Mayor de Tunja, 2021a).

Table 3. Coverage of basic services in Tunja by urban and rural area, year 2018

Zone/ Service	Energy service	Aqueduct	Sewer	Gas	Internet	Garbage collection
Urban	99.75%	99.58%	99.21%	92.90%	59.32%	99.26%
Rural	96.74%	80.78%	7.08%	6.88%	6.07%	9.79%

Source: National Census of Population and Housing (DANE, 2018)

Table 4. Water sources used by the inhabitants of Tunja to prepare food (2018)

Source of water to prepare food	Cases
Public aqueduct	51708
Village aqueduct	1587
Community distribution network	225
Well with pump	99
Well without pump, cistern, jug or borehole	147
Rain water	49
River, ravine, spring, source	63
Public stack	15
Tank car	54
Bottled or bagged water	23
Bottled or bagged water	108
Does not report	1016
Total	55091

Source: Prepared by the authors with figures taken from DANE (2018)

Likewise, the housing deficit in the rural area for the year 2020 exceeds that of the municipal seat, i.e., the majority of the rural population of the city of Tunja lives in unfavorable conditions for their safety and quality of life.

Table 5. Housing deficit for Tunja in 2020

Type of deficit	Municipal Headquarters	Rural
Quantitative	1,43%	2,18%
Qualitative	11,02%	51,48%
Housing	12,45%	53,66%

Source: own elaboration with data from DANE (2020)

According to data from the Rural Agricultural Planning Unit (UPRA, by its acronym in Spanish), for the year 2019 the number of allegedly informal properties throughout the Colombian territory was approximately 2,365,011, with Boyacá and Antioquia being the departments with the highest percentage of informality (Table 6).

The informality index of land tenure in Colombia refers to possible informal rural areas. It is linked to criteria that determine whether this condition exists or not. Therefore, this index is an input in the territorial planning process, especially in rural areas of the country (UPRA, 2020).

Table 6. Departments with the highest land informality index for 2019-2020

Department	% of informality	Presumably informal properties	% of national participation
Boyacá	63,36	362.408	15,32
Antioquia	51,06	282.819	11,96
Cundinamarca	41,49	282.706	11,95
Nariño	67,91	217.464	9,20
Cauca	66,46	186.912	7,90
Santander	47,21	121.04	5,12
Tolima	57,37	119.108	5,04
Valle del Cauca	42,96	110.843	4,69
Córdoba	59,02	83.481	3,53
Huila	47,35	74.731	3,16

Source: own elaboration with data from UPRA (2020)

One of the proposals of the National Development Plan for 2022-2026 regarding the informality of land tenure is to design and implement a comprehensive resettlement strategy that includes not only legalization but also urban control, in the same way this strategy aims to improve housing in human settlements as long as they are on habitable land.

It also proposes the implementation of financial procedures and mechanisms focused on the resettlement of the population living in high-risk areas is

proposed. Some of these mechanisms are the promotion of the supply of social housing, family housing subsidy, democratization of credit for access housing solutions, housing provision and improvement.

In this regard, the Town Hall of Tunja for the year 2021 only recognized four settlements, despite the informality of the land in the city, which are named in the diagnostic phase of the Tunja 2023-2035 territorial planning plan. These settlements are located in the rural area close to the urban area and are characterized by their lack of access to public services, which affects the environmental and health order as well as by fragile construction structures that pose a risk in the event of a seismic event or environmental failure (Alcaldía Mayor de Tunja, 2021b), however, each of these settlements have different conditions.

The data presented below refer to the following rural settlements: Runta village settlement, Pirgua village settlements in the Villa del Rosario sector, La Cascada sector and special mining reserve sector. Figures 8 and 9 show the number of houses in the villages of Runta and Pirgua, respectively, that have services such as electricity, natural gas, aqueduct, garbage collection, sewage and Internet.

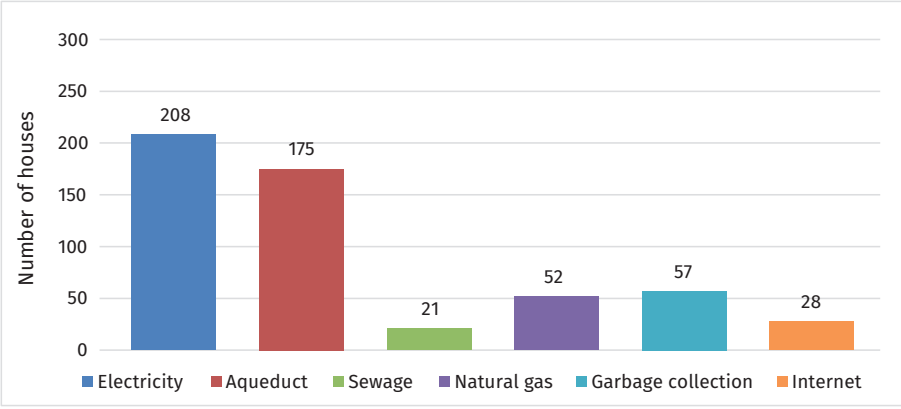

Figure 8. Number of homes with access to basic services in the Runta village for the year 2021

Source: prepared by the authors with data from the Town Hall of Tunja.

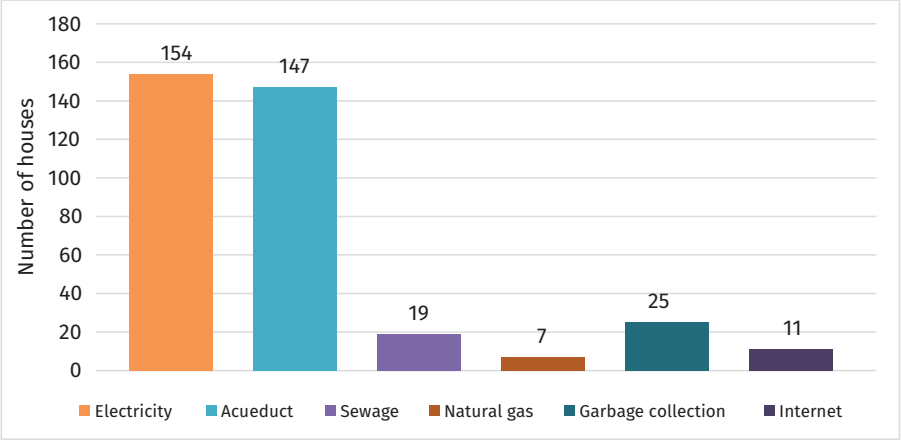

Figure 9. Number of houses with access to basic services in the Pirgua village for 2021

Source: prepared by the authors with data from the Town Hall of Tunja.

According to the information from the Town Hall of Tunja (Alcaldía Mayor de Tunja, 2021a), Runta had a total of 226 houses, 915 people and 306 houses by 2021. I.e., of the 306 houses, more than half had electricity and water service; however, less than 20% of houses had access to natural gas and garbage collection service, and even less than 10% had sewage and Internet service.

Regarding Pirgua, in 2020 it had a population of 599 people, 171 houses and 219 homes (Alcaldía Mayor de Tunja, 2021a). The majority of these houses (more than 65%) had electricity and aqueduct, while about less than 10% of the houses had sewage, natural gas, garbage collection and Internet services.

Table 7 groups some of the main problems of the informal settlements of Tunja, which show not only the structural problems of the houses, but also the health problems of the population, since, without having a garbage collection service, they resort to burning or improper disposal. Likewise, the entire population of the Pirgua village is exposed to bad odors and infections due to the proximity to the landfill and the sewage treatment plant.

Table 7. Main problems of rural settlements in Tunja

Municipal districts	Settlement	Problems
Pirgua	Villa del Rosario	Erodible soils, water service twice a week, no sewer, natural gas or garbage collection
	La Cascada	Gull area, houses made of unstable materials on a surface with a steep slope, dirt roads
	Reserva Especial Minera	Proximity to the PTAR, landfill and clay and pottery extraction areas
Runta	Runta vía Tunja-Bogotá	Semi-detached and scattered houses, unpaved dirt roads, insecurity, clandestine cow and pig slaughterhouses

Source: elaboration of the authors

Likewise, the problems of housing and access to public services can be seen reflected in the statistics of education levels in rural areas. The data in Annex 2 show that one of the services with the lowest coverage in rural areas is Internet service which could be one factor among many in the educational level of the rural population. Table 8 shows that the majority of the rural population has only a primary education and that as the level of education increases, the number of people using the service decreases.

Table 8. Education levels of the rural population in Tunja, year 2021

Municipal districts	Population	Primary	Secondary	Superior	Postgraduate
Barón Germania	398	192	34	6	0
Barón Gallero	378	196	0	11	0
La Esperanza vereda	520	235	65	20	0
Chorro Blanco- La Primavera	1106	528	17	47	0
La Hoya	616	309	20	28	0
La Lajita	219	112	0	10	0
Pirgua	599	191	0	60	7
Runta	915	366	62	60	0
Tras del Alto	929	381	94	62	0
Porvenir	470	189	16	26	0
La Cascada	310	118	0	16	1
Runta Parte Alta	944	380	0	55	0
La Cabaña-Runta	283	112	0	21	0
La Colorada	115	97	0	0	0

Source: prepared by the authors, figures taken from the Town Hall of Tunja.

The study and recognition of some informal settlements in the rural area of Tunja by the municipality is fundamental in the territorial planning process, however, it is noted that within the urban area there are houses in

precarious conditions both in terms of infrastructure and access to services; at first glance it can be seen that the materials that make up the structure of the houses are not stable, therefore, their situation may be affected in the event of heavy rains, seismic movements, or due to the deterioration of said materials.

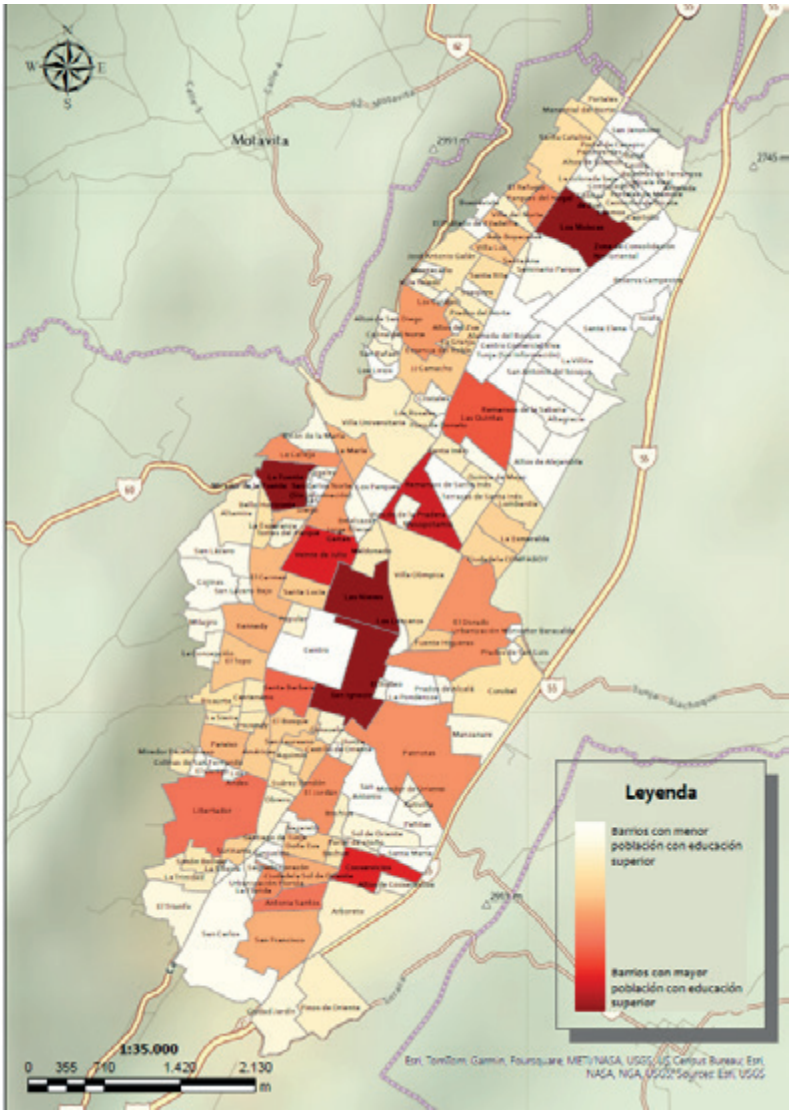

Figure 10. Map of university education by neighborhoods in Tunja

Source: prepared by the authors with data from the Town Hall of Tunja.

The Figure 10 shows an uneven distribution of the university educated population across the neighborhoods of Tunja. The neighborhoods colored in darker shades of red indicate a higher concentration of residents with higher education, highlighting a pattern in which the central and southern areas of the city, such as Villa Universitaria, La María, and San Antonio, have a significantly higher percentage of residents with university degrees. This could be related to the proximity of educational institutions, accessibility to resources, or urban planning that favors these neighborhoods.

On the other hand, areas in lighter shades, representing a lower population with university education, are mainly located in the suburbs, such as in the neighborhoods of Mirador del Norte and Antonia Santos. This phenomenon may be influenced by several socio-economic factors, including lower incomes, limited access to educational opportunities, or a lesser prioritization of higher education in planning and community services. This map highlights the need for policies focused on improving access to higher education in less favored areas to promote a more equitable distribution of educational opportunities across the city.

Although Tunja is recognized as a university city, the map shows a remarkable contrast in the distribution of university education among its neighborhoods. While some central neighborhoods have high percentages of the population with higher education, others, especially on the outskirts, have significantly lower percentages. This phenomenon can be partly attributed to the fact that many students attending universities in Tunja come from other regions and tend not to settle permanently in the city after completing their studies. As a result, although higher education institutions attract many young people, their impact on the educational level of the permanent local population may be limited. This dynamic poses challenges for the city in terms of talent retention and equitable distribution of the educational and cultural benefits that come with being an educational hub.

When monitoring some houses located in neighborhoods that, according to Hidalgo (2014), had marginal origins, it is found that in the neighborhood of San Lázaro in 2014 there is the presence of houses with self-construction processes, without access to paved roads and located in high slope area, the structure of some houses in the neighborhoods of El Dorado and Libertador is also evident.

By 2021, the neighborhood of San Lázaro had 644 houses, all of which had access to electricity, water and sewer service, but only 74 had garbage collection and 67 had natural gas service (Alcaldía Mayor de Tunja, 2021a), i.e., more than 80% of the houses had to resort to another alternative such as firewood or propane gas, and also to find a solution for the treatment of their

waste, which in some cases results in the burning of garbage or in its accumulation in an abandoned lot.

DISCUSSION

At the national level, the issue of informal settlements is linked to a tradition of violence that leads to situations of forced displacement, land dispossession, threats, and other violations of human integrity. In Tunja, some areas where people displaced by violence have settled coincide with neighborhoods of marginal origin, such as the Libertador, San Lázaro, Altamira, El Dorado, Jordán, Asís, and Obrero.

Additionally, in the conceptualization of informal settlements, their presence is often linked to the absence or low coverage of public services. However, in Tunja, although the neighborhoods are initially informal, their service coverage exceeds 90% of the urban area. Therefore, the category of "informal" would be subject only to legal elements, such as the municipal agreements of each neighborhood, which guarantee more significant social development of these spaces.

The situation in rural areas is different. Only four areas with informal settlements are recognized by the municipality. At the same time, more than 80% of the households have deficiencies and low coverage in access to basic services, which affects the economy and the health of the population. Therefore, informality is considered a primary characteristic of the entire rural area, taking into account access to services, education and housing, which is consistent with the aforementioned concepts of informal settlement and the living conditions of these spaces.

CONCLUSIONS

The socio-economic characterization of the informal settlements of Tunja is relevant, since it denotes the informal origin that most of the territory of the city has as a result of the small number of neighborhoods that have been recognized by the municipality, therefore, it is concluded that the city of Tunja until 2022 will consist mostly of consolidated illegal human settlements, since, despite the informality of its neighborhoods, not all of them present marginal conditions, since some have all the basic services, paved roads and constructions in stable materials.

Additionally, the development of the document reflects the impact that the spatial factor has on the socio-economic conditions of the population, since, in the case of Tunja, it coincides that informal settlements are found on the outskirts of the city, which they do not have access to basic services, and they are also located in areas of environmental failure, therefore. If we attended to what Bonet (2007) and Fujita and Krugman (2004) indicate regarding the study of the causes and reasons for the concentration or agglomeration in said

specific areas, then, a response could be given to the inequalities found in the rural area, the concentration of poverty and the formation of settlements, with space as the main point of study.

In fact, the informal settlements recognized in Tunja reflect the agglomeration theory of Polèse and Rubiera (2009) since the presence of population in these areas can be linked to the presence of mining areas in the case of the settlements in the village of Pirgua, since it is the space with the largest number of mining titles in the city that generates employment opportunities and, therefore, urbanization.

Regarding the houses in the urban area that are not considered informal settlements, it is concluded that although they are located in neighborhoods with municipal consent or are not subject to any illegal, marginal or informal designation, they have weak structures and difficult access to public services, as in the case of San Lázaro.

However, the diagnostic document carried out by the municipality in 2021 only refers to the informality of the neighborhoods but not to the informality of the buildings or houses found in them, but the case of neighborhoods like Antonia Santos that until 2021 did not have a municipal agreement, even though it is a neighborhood built with national and municipal resources, therefore, the houses comply with construction standards to be habitable. That is, the non-legal status of the neighborhoods does not imply that their constructions are informal or outside the law; however, the percentage of illegal constructions in the city is unknown.

Finally, the paper clarifies the use of the terms informal settlements and marginal settlements in the article; these terms were used because of the bibliography found referred to uninhabitable areas or areas with dangerous living conditions in such a way, however, the words informal and marginal can generate stigmatizing actions against the inhabitants of the settlements, which is contrary to the objective of this article, which aims to contribute to the process of recognition of these areas, taking into account that the inhabitants of these spaces deserve to be heard and accompanied in order to achieve full respect for their rights.

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The authors declare no conflicts of interest.

AUTHORS' CONTRIBUTION

Authors' contributions are equal. This article is adapted from the first author's undergraduate monograph.

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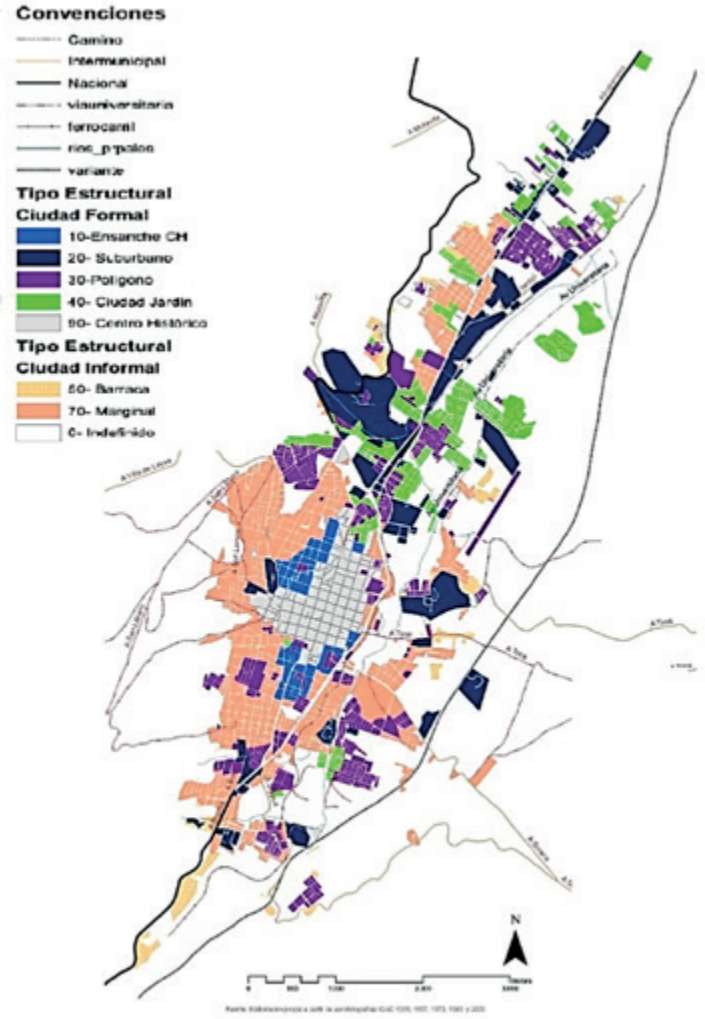
Appendix 1. Growth of Tunja by urban types, year 2005.



Source: Hidalgo (2012a) with data from the IGAC

Appendix 2. Rural homes with access to basic services in the city of Tunja, year 2021

Municipal districts	Total housing stock	Energy service	Aqueduct	Sewer	Gas	Garbage collection	Internet
Barón Gallero	182	105	92	6	1	1	3
Barón Germania	135	95	68	8	2	1	2
Chorro Blanco-La Primavera	415	268	227	15	19	24	13
La Cabaña-Runta	92	63	57	5	4	8	11
La Colorada	49	30	22	5	1	5	1
La Esperanza	173	122	96	8	3	4	4
La Hoya	203	154	122	13	1	1	2
La Lajita	83	57	47	4	0	0	1
Porvenir	118	113	91	8	4	9	6
Runta Parte Alta	277	207	177	13	36	43	22
Tras del Alto	335	223	172	6	2	3	8
Runta	306	208	175	21	52	57	28
Pirgua	219	154	147	19	7	25	11
La Cascada	119	76	73	7	3	8	9

Source: own elaboration with data taken from Alcaldía de Tunja (2021a)

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1918, L'Ovale delle Apparizioni (The Oval of Apparition)

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Il figlio del costruttore, 1921

POLÍTICA EDITORIAL

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La revista **Apuntes del Cenes** está dirigida a las comunidades académicas e investigativas de instituciones públicas y privadas, nacionales e internacionales y demás interesados en los manuscritos publicados. Esta revista se difunde a través de canjes con centros y grupos de investigación, así como de las bibliotecas y facultades de ciencias económicas, administrativas y sociales de las principales universidades de Colombia, Iberoamérica y otros lugares del mundo.

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La revista **Apuntes del Cenes** tiene como misión aportar al desarrollo económico y académico, así como al progreso del entorno sociopolítico de los países iberoamericanos y del resto del mundo a partir de la calidad de las investigaciones publicadas.

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Los autores deben dar cuenta exacta de su trabajo realizado, así como una discusión objetiva de su aporte. Los datos y fuentes deben estar presentadas con precisión en el documento. Los artículos deben ser claros y bien estructurados. Las declaraciones fraudulentas a sabiendas inexactas, constituyen un comportamiento poco ético y son inaceptables. Los artículos de revisión y demás publicaciones profesionales también deben ser precisos y objetivos.

Retención y acceso a los datos: Los autores deben proporcionar los datos originales en un documento aparte para revisión editorial, también deben permitir acceso público a dichos datos, o garantizar la disponibilidad de los mismos después de su publicación.

Originalidad y plagio: Los autores deben asegurarse de que han escrito obras totalmente originales, si los autores han utilizado el trabajo o las palabras de otros, o ambos, deben asegurarse de que estos hayan sido debidamente citados. El plagio se manifiesta de muchas formas, desde hacer pasar un documento de otros autores como propio, hasta copiar o parafrasear partes sustanciales de un documento de los demás (sin atribuir reconocimientos), reclaman como propios los resultados de las investigaciones llevadas a cabo por otros. El plagio se presenta cuando un autor presenta como ideas propias, datos creados por otros. Los casos de plagio son los siguientes: copia directa de un texto sin entrecomillar o citar la fuente, modificación de algunas palabras del texto, paráfrasis y falta de agradecimientos. La revista se apoya en herramientas que detectan cualquiera de estos casos en los artículos postulados. El plagio en todas sus formas constituye un comportamiento poco ético, el cual es inaceptable en las publicaciones científicas.

No se considera original un trabajo que sea traducido de otro idioma.

Sobre el plagio:

La Revista se permite recordar que, frente a conductas demostradas de plagio en los artículos, se vetará a el(los) autor(es) permanentemente. Se recuerda que el plagio es la acción mediante la cual se reproducen o parafrasean segmentos de trabajos de otros autores sin la correspondiente referencia o reconocimiento. Se plagia cuando:

- Se incluyen o usan en el trabajo fragmentos de los trabajos de otras personas sin comillas o referencia de la fuente.
- Se copia y pega, de manera directa, de otras fuentes sin referenciar o sin indicar que se trata de una cita textual.
- Se incluyen imágenes, tablas o diagramas sin reconocimiento de su procedencia.

Es pertinente aclarar que el plagio, sea consciente o no, es una falta grave y judicializable.

Autoplagio: se considera autoplagio el hecho de que los autores toman secciones de otros trabajos que ya han elaborado sin citarse a sí mismos, es fundamental que el documento no tenga las mismas coincidencias de trabajos que ya estén publicados por los propios autores.

La revista tampoco acepta artículos que evidencien uso excesivo de autocitas y manipulación intencionada de citas.

La fabricación de resultados: se ocasiona al mostrar datos inventados por los autores; la falsificación resulta cuando los datos son manipulados y cambiados a capricho de los autores; la omisión se origina cuando los autores ocultan deliberadamente un hecho o dato. La revista se guía por las normas internacionales sobre propiedad intelectual y derechos de autor, con el fin de evitar casos de fabricación, falsificación, omisión de datos y plagio

Publicación concurrente, múltiple o redundante: En general, un autor no debe publicar manuscritos que describan esencialmente la misma investigación publicada en más de una revista o publicación primaria. La presentación del mismo manuscrito a más de una revista constituye al mismo tiempo un comportamiento poco ético y su publicación es inaceptable. En general, un autor no debe someter un artículo publicado anteriormente a consideración de otra revista. La publicación de algunos tipos de artículos (por ejemplo, las guías metodológicas, traducciones) en más de una revista, es justificable en algunos casos siempre que se cumplan condiciones específicas. Los autores y editores de las revistas interesadas deben estar de acuerdo con la publicación secundaria, en la cual deben reflejar los mismos datos y la interpretación del documento primario. La referencia principal debe ser citada en la publicación secundaria.

Reconocimiento de las fuentes: Siempre se debe dar el reconocimiento adecuado al trabajo de otros. Los autores deben citar las publicaciones que han sido influyentes en la determinación de la naturaleza del trabajo reportado. La información obtenida de forma privada, como en conversaciones, la correspondencia o discusión con terceros, no se debe utilizar o informar sin explícito permiso escrito de la fuente. La información obtenida en el curso de los servicios confidenciales, tales como manuscritos arbitrales o las solicitudes de subvención, no deben ser utilizados sin el permiso explícito y por escrito del autor de la obra de la cual se toma la información.

La autoría del documento: Debe limitarse a *máximo tres autores* (si son del mismo país o institución), pueden ser cinco (si son de diferentes países o instituciones), los cuales, han realizado una contribución significativa en la concepción, diseño, ejecución o interpretación del artículo. Si existen otros profesionales que hayan participado en aspectos sustantivos del proyecto de investigación, deben ser reconocidos y figurar como contribuyentes. El autor principal debe garantizar que todos los coautores hayan revisado y aprobado la versión final del documento, acordando de manera unánime su presentación para su publicación. Toda persona que figure como autor del trabajo debe haber participado en el proceso de investigación y en la elaboración del material que se presenta a la Revista. Se espera que no aparezcan como autores personas que no participaron en las actividades descritas; quien solo haya participado en parte de estas puede figurar en la sección de agradecimientos. Invitamos a ver el manual sobre autoría del **COPE**.

Conflicto de intereses: Todos los autores deben revelar en su manuscrito cualquier conflicto de interés sustantivo financiero u otro tipo de interés que pudiera presentarse en los resultados o interpretación de su manuscrito. Todas las fuentes de apoyo financiero para el proyecto deben tener los créditos que les correspondan. Algunos ejemplos de posibles conflictos de interés que deben ser manifiestos incluyen empleo, consultorías, propiedad de acciones, honorarios, testimonio de expertos de pago, solicitudes de patentes, registros y becas u otro financiamiento. Los posibles conflictos de intereses deben hacerse públicos en la etapa más temprana posible del proceso editorial.

Errores fundamentales en las obras publicadas: Cuando un autor descubre un error significativo o inexactitud en su artículo publicado, es su obligación notificar de inmediato al Editor de la revista o al Comité Editorial y cooperar con el Editor para retirar o corregir el documento. Si el Editor se entera por medio de un tercero que una obra publicada contiene un error importante, es la obligación del Editor corregir de manera breve el artículo y aportar pruebas al autor de la corrección del documento original.

Los autores deben diligenciar y enviar los siguientes Formatos:

- Formato # 6 Declaración de cesión de derechos de autor
- Formato # 7 Conflicto de intereses
- Formato # 8 Cumplimiento de principios éticos y científicos
- Formato # 9 Conjunto de datos

En resumen, cuando se presenta un trabajo a la revista, los autores garantizan que:

- Que el artículo no ha sido aceptado para su evaluación en otra revista, ni ha sido publicado previamente, ni se encuentra en proceso de revisión por otra revista o medio de divulgación físico o electrónico.
- Todos los autores avalan haber revisado y aprobado la versión final del documento.
- En caso de ser aceptado, el trabajo no podrá ser reproducido en otro lugar o idioma sin citar a la Revista.
- Los autores autorizan a la Revista para realizar una evaluación anti-plagio, empleando software especializado, del trabajo sometido.

- Que, en caso de haber sido reportada la publicación de una versión previa como working paper (o 'literatura gris') en un sitio web, y si llega a ser aceptada su publicación como artículo, será retirado del sitio de Internet, en el que se dejará solamente el título, el resumen, las palabras clave y el hipervínculo a la revista.
- Que una vez publicado en Apuntes del CENES no se publicará en otra revista.

Invitamos a los autores a revisar las guías existentes en relación a los temas más comunes de la autoría enfrentados por miembros de COPE.

De los pares evaluadores: se destacan las siguientes consideraciones:

El Comité Editorial de la Revista invita a ser par evaluador a personas con trayectoria investigativa, de acuerdo con el área de cada uno de los trabajos enviados. Sin embargo, si el par considera que no cumple con el perfil, no cuenta con el tiempo o presenta conflicto de intereses para evaluar un documento, lo debe hacer saber, para que el Comité Editorial asigne a otra persona para la evaluación del trabajo.

El par evaluador debe presentar un concepto que sea lo más claro y riguroso posible, sin hacer uso de lenguaje ofensivo, para que el Comité Editorial pueda tomar la decisión sobre la aceptación o rechazo de un manuscrito.

Los documentos enviados a los evaluadores, por la **Revista Apuntes del Cenes** son confidenciales y, por ende, la revisión de estos se limita a fines evaluativos. La citación de estos como manuscritos no publicados o el uso de sus contenidos antes de la publicación constituyen un empleo inadecuado y no autorizado.

Árbitros: El comité de evaluación está integrado por profesionales con amplia experiencia y reconocimiento académico en los temas tratados en cada artículo. Los criterios de evaluación son: originalidad del contenido; rigor conceptual; Problemas metodológicos; claridad y coherencia, tanto en la argumentación como en la exposición; la calidad de las fuentes y referencias; contribuciones al conocimiento; preparación adecuada del resumen; título de relevancia y conclusiones. Esto asegura que los artículos publicados en Apuntes del CENES sean de excelente calidad.

Deberes de los pares:

AdC recomienda revisar las Guías Éticas para Revisores Pares de COPE

Contribución a las decisiones editoriales: La revisión por pares ayuda al editor en la toma de decisiones editoriales y a través de las comunicaciones con el autor también puede ayudarle en mejorar la redacción y calidad del documento. La revisión por pares es un componente esencial de la comunicación académica formal, y se encuentra en el corazón del método científico. Apuntes del CENES comparte la opinión que los investigadores que deseen contribuir en las publicaciones tienen la obligación de participar justamente en procesos de revisión por pares.

Puntualidad: Cualquier árbitro seleccionado que no se sienta calificado para revisar el artículo debe informar oportunamente que le es imposible realizar su revisión comunicando al editor su decisión.

Confidencialidad: Todos los manuscritos recibidos para su revisión deben ser tratados como documentos confidenciales. No deben ser presentados o discutidos con terceros, excepto según lo autorizado por el editor. El proceso de arbitraje se realiza en la modalidad de revisión por pares doble ciego, garantizando la confidencialidad y anonimato de los autores y árbitros. En caso de discrepancia entre uno de los dos evaluadores, el texto se enviará a un tercer árbitro, cuya decisión definirá su publicación.

Normas de objetividad: Los comentarios deben llevarse a cabo de manera objetiva. La crítica personal al autor es inadecuada. Los árbitros deben expresar sus puntos de vista con claridad, apoyados en argumentos.

El reconocimiento apropiado de fuentes: Los revisores deben identificar las obras publicadas relevantes que no hayan sido citadas por los autores. Cualquier afirmación, observación, derivación, o argumento que se haya registrado previamente debe ir acompañado de la citación correspondiente. Un revisor también debe llamar la atención del editor al advertir cualquier similitud sustancial o parcial entre el manuscrito bajo consideración y cualquier otro documento publicado del que tengan conocimiento.

Revelación de conflictos de intereses: Los materiales inéditos revelados en un artículo presentado en el proceso de selección no deben utilizarse en investigaciones propias de los revisores sin el consentimiento expreso y por escrito del autor. La información privilegiada o las ideas obtenidas mediante la revisión por pares deben ser confidenciales y no se utilizarán para beneficio personal. Los revisores no deben evaluar artículos en los que tienen conflictos de interés que resulten de las relaciones o conexiones de competencia, de colaboración o de otro tipo con alguno de los autores, empresas o instituciones relacionadas con los textos a evaluar.

MATERIALES ADICIONALES PARA LOS EVALUADORES

1: https://publicationethics.org/files/Who_owns_peer_reviews_discussion_document.pdf
2: https://youtu.be/JxStMmN0Rk8
3: http://senseaboutscience.org/activities/peer-review-the-nuts-and-bolts/
4: https://publons.com/community/academy/

DE LOS COMITES CIENTÍFICO/EDITORIAL

Funciones del Comité Científico:

1. Ofrecer apoyo al Comité Editorial y al Director-Editor en la formulación de la política editorial.
2. Asesorar al Comité Editorial y al Director-Editor en la definición de los parámetros de calidad ética y científica de la revista.
3. Invitar a miembros reconocidos de la comunidad académica nacional e internacional para que publiquen sus trabajos.
4. Promover la difusión de la revista en los medios académicos nacionales e internacionales.
5. Participar como evaluadores de los trabajos recibidos para su publicación o sugerir a otros expertos como pares académicos.

Funciones del comité editorial:

1. Establecer de manera conjunta con el Director-Editor la política editorial.
2. Proponer al Editor, en los casos que él lo solicite, los lectores o evaluadores para los artículos postulados en la revista.
3. Servir de apoyo a la coordinación editorial de la revista.
4. Promover la difusión de la revista en los medios académicos nacionales e internacionales.
5. Participar como evaluador de los trabajos recibidos para su publicación o sugerir a otros expertos como pares académicos.

Deberes del equipo científico editorial

Decisiones publicación: El Editor de la revista Apuntes del Cenes (arbitrada por pares académicos) y el Comité Científico/Editorial, son los responsables de decidir cuales artículos presentados a la revista deben publicarse. La aprobación de la obra en cuestión y su importancia para los investigadores y los lectores hacen parte de estas decisiones. El Editor se guía por las políticas del Consejo Editorial de la revista, acogiéndose a los aspectos legales vigentes en materia de difamación, violación de derechos de autor y plagio. El Editor puede acudir al apoyo de otros editores o revisores para la toma de esta decisión.

Juego limpio: El equipo editorial de Apuntes del Cenes evaluará solamente el contenido intelectual de los manuscritos sin distinción de raza, género, orientación sexual, creencias religiosas, origen étnico, nacionalidad o filosofía política de los autores.

Confidencialidad: El Editor y el equipo editorial de Apuntes del Cenes no deben revelar ninguna información sobre un manuscrito enviado, a nadie más que a los autores, revisores, potenciales revisores, otros asesores editoriales correspondientes, y al editor, si es apropiado.

Revelación de conflictos de intereses: Los materiales inéditos revelados en un manuscrito presentado para su publicación en la revista no deben utilizarse en investigaciones propias de un editor sin el consentimiento expreso y por escrito del autor. La información privilegiada o las ideas obtenidas mediante la revisión por pares deben ser confidenciales y no se utilizarán para beneficio personal. Los editores no deben conceptuar sobre un artículo si considera que el documento puede generar conflictos de intereses que resultan de las relaciones o conexiones competitivas, de colaboración o de otro tipo con cualquiera de los autores, empresas, o (posiblemente) instituciones conectadas a las revistas.

Notas: El editor debe dar respuesta cuando se presenten quejas con relación a un artículo publicado. Así mismo, se comunicarán oportunamente con el autor del artículo, además aplicará el debido proceso, también emitirá comunicaciones que considere pertinentes a las instituciones competentes y organismos de investigación, y si la denuncia se sostiene, la publicación debe hacer la corrección, la retracción, la expresión de preocupación, u otra nota, que pueda ser relevante para aclarar tal situación. Cada acto identificado de conductas poco éticas en la publicación será examinado, aunque sea descubierto años después de la publicación.

Cuando el autor sea un integrante del Cuerpo Editorial de la Revista, se inhabilitará para las revisiones y decisiones que compete tomar sobre el trabajo.

Política de preservación y autoarchivo

Esta revista utiliza el sistema LOCKSS para crear un sistema de archivo distribuido entre bibliotecas colaboradoras, a las que permite crear archivos permanentes de la revista con fines de conservación y restauración. Más

Una vez se disponga del documento en pdf editado, el autoarchivo se deposita en los sistemas de información:

- Open Journal System (OJS).
- Repositorio de la Universidad Pedagógica y Tecnológica de Colombia.

Adicionalmente, el autoarchivo queda consignado en los demás sistemas de información que son exigidos en este procedimiento. Todos los datos bibliográficos de cada artículo se catalogan en la base de datos de la Universidad Pedagógica y Tecnológica de Colombia con los enlaces correspondientes a los respectivos repositorios.

Las fechas en que se realiza dicho autoarchivo corresponden al 1 de enero y el 1 de julio del año correspondiente.

Para los autores: luego de publicado un artículo, los autores pueden depositar versiones de su trabajo en un repositorio institucional o de otro tipo de su elección.

Patrocinador

Facultad de Ciencias Económicas y Administrativas
Universidad Pedagógica y Tecnológica de Colombia

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Para dar cumplimiento a lo previsto en el artículo 10 del Decreto 1377 de 2013, reglamentario de la Ley 1581 de 2012, La Universidad Pedagógica y Tecnológica de Colombia, considerada como responsable y/o (sic) encargada del tratamiento de datos personales, manifiesta que los datos personales de nuestros autores, integrantes de los diferentes comités y pares evaluadores, se encuentran incluidos en nuestras bases de datos; por lo anterior y en cumplimiento de las disposiciones legales vigentes, la Universidad solicitará siempre su autorización, para que en desarrollo de sus funciones propias como Institución de Educación Superior, en especial las relacionadas con la docencia, la extensión y la investigación, la Universidad Pedagógica y Tecnológica de Colombia pueda recolectar, recaudar, almacenar, usar, circular, suprimir, procesar, intercambiar, compilar, dar tratamiento, actualizar, transmitir y/o (sic) transferir a terceros países y disponer de los datos que le ha suministrado y que han sido incorporados en las bases de datos de todo tipo que reposan en la Universidad.

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Nuestros autores, integrantes de los diferentes comités y pares evaluadores, autorizan que sus datos personales sean tratados por la Universidad Pedagógica y Tecnológica de Colombia, de conformidad con lo dispuesto por la Ley 1581 de 2012 y el Decreto 1377 de 2013.

De acuerdo con los procedimientos contenidos en las normas atrás citadas, los titulares podrán ejercer sus derechos a conocer, actualizar, rectificar y suprimir sus datos personales enviando su solicitud al correo de la revista.

ABOUT THE JOURNAL

AIMS AND SCOPE

Apuntes del Cenes is a biannual, double-blind peer-reviewed scientific journal in which articles on economic theory, economic policy, regional economics, finance, and other topics related to economics in the national and international context are published.

Target Audience

Apuntes del Cenes is aimed at academic and research communities from public and private, national and international institutions and others interested in issues related to economic science.

Mission

Apuntes del Cenes journal's mission is to contribute to the discussion and scientific production in the area of economics based on the quality of the articles published.

Peer Review System

The received articles will be submitted to an editorial process that will be carried out as follows: The articles received will be evaluated by the Editor and the members of the Scientific and the Editorial Committee, who will determine the pertinence of the manuscript. Once established that the article meets the thematic requirements, in addition to the editorial standards indicated in the Instructions for Authors, it will be sent to two referees (peer reviewers external to the publishing institution), who will determine anonymously:

- to publish without changes
- publish after making adjustments, whether minor or important; and
- do not publish

In case of discrepancy between the first review, the manuscript will be sent to a third referee, whose decision will define its publication.

When an article is classified as "publishable with adjustments," the concept or concepts that support it are put to the author's consideration to effect the proposed reforms. The review team will inform the author (s) during the different stages of the editorial process.

The arbitration process of the articles is done in double blind peer review mode or double anonymized review, guaranteeing the confidentiality and anonymity of authors and reviewers.

Evaluation Times: The process of evaluating a document takes about six (6) months between the call of the evaluators, their acceptance and delivery of the concept. This period may be longer or shorter and depends mainly on the achievement of the relevant evaluator, his notification of acceptance of the evaluator and his promptness in sending the concept.

Delivery of corrections: If the concepts of the pairs suggest slight modifications, the authors must adhere to a timeline that does not exceed eight (8) weeks. If an article receives concepts that suppose substantial modifications, and the committee considers that it can be accepted for a new cycle of evaluations, the authors will have to remit their adjustments in a period no longer than 16 weeks. In all cases, an attached report must be submitted, relating the changes that were made to the proposal.

Rejection of articles: The purpose of the evaluation process in AdC, besides validating the advances in knowledge in our thematic areas, is to offer an opportunity to authors to improve their manuscripts. In this regard, we hope that the authors will benefit from the comments of the referees when their document is rejected for publication.

Although the journal is willing to receive re-considered articles, the authors are asked not to submit a corrected version of a rejected article until the next call. The author must inform the editor in detail that the article has been restructured according to the previous comments. The editor will inform the authors of the time they should wait, if they express interest in submitting their article once again. The definitive rejection of an article will be given when it does not correspond to the editorial or thematic line of the journal.

Notes of interest

The Editor and the Editorial Committee of the journal Apuntes del CENES, are the instances that decide the publication of the originals. We clarify that the sending of material does not oblige its publication. The errors of format and presentation, the non-compliance with the guidelines of the journal or the orthographic and syntactic incorrectness, may be reasons for rejection of the work without passing it to evaluation.

Apuntes del Cenes may publish, in case it has been found, the following scientific malpractices: plagiarism, falsification or invention of data, individual appropriation of collective authorship and duplicate publication for it, all articles are submitted to anti-plagiarism software Turnitin .

If the journal does not respond to the receipt of a work sent within eight (8) days or if you have not received a response within that period, please redirect your message to the email: apuntes.cenes@uptc.edu.co

The editorial team must inform the author (s) in the different stages of the editorial process.

Publication Frequency

Apuntes del CENES is a biannual publication (published in January and June).

The articles will be received according to the dates established in the call for papers.

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Apuntes del Cenes provides immediate open access to its content, based on the principle that providing the public with free access to research helps a greater global exchange of knowledge.

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