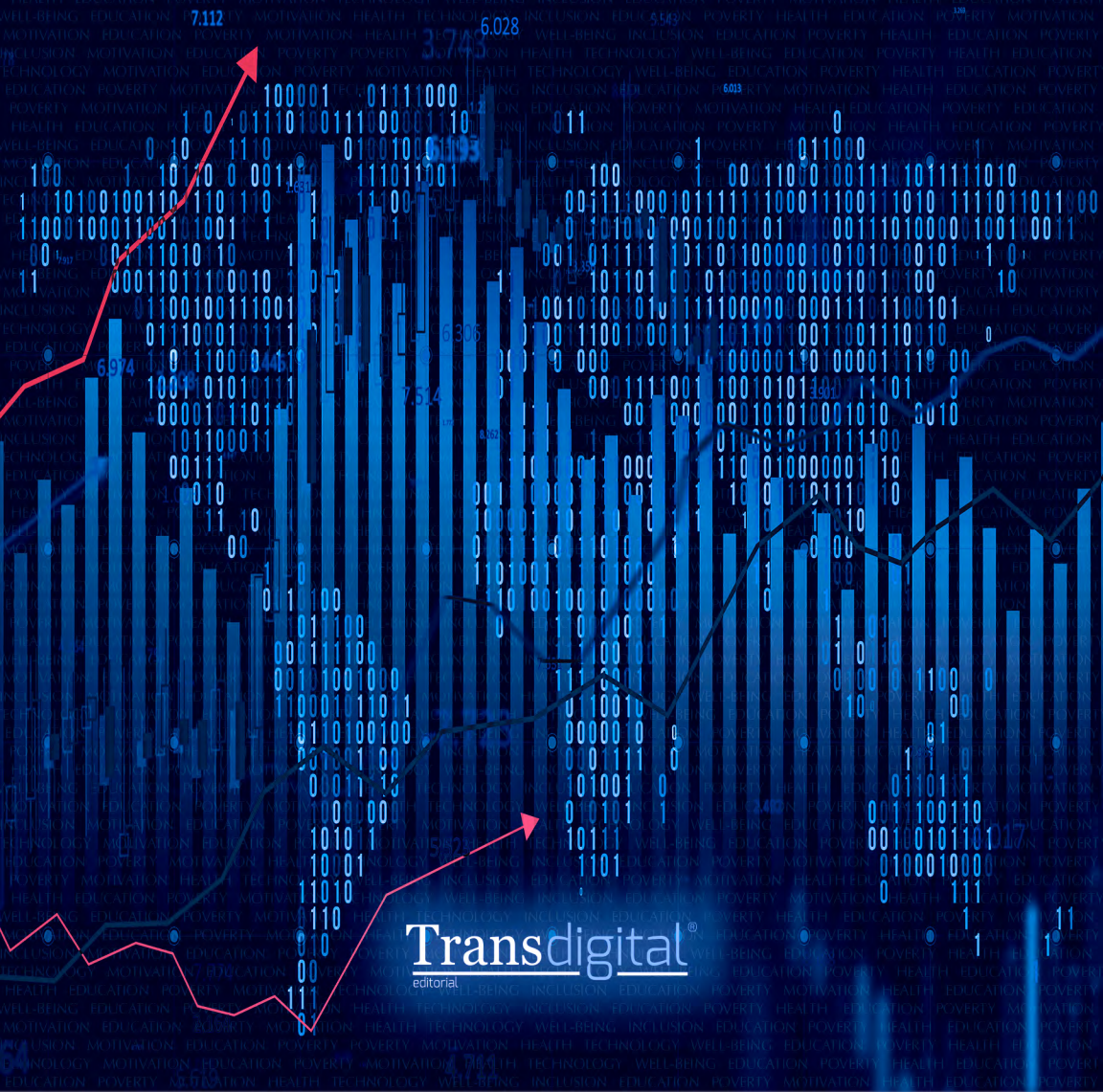
EDI

CONSTRUCT PROPOSAL

HÉCTOR GERARDO TOLEDO ROSILLO



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For her support and understanding,

to my beloved:

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To my children:

Héctor Enrique

Karol Geraldine

Federico Augusto

Héctor Gerardo

To my grandchildren:

David Santiago

Emilia

Emiliano

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PROLOGUE

The imperatives for assessing development among nations have changed drastically in recent decades, such that the indicators that once allowed for comparisons of the development of societies are now questionable, if not obsolete.

The reflection that Ph.D. Toledo raises on these issues is no small matter. Each country has its own characteristics, conditions, and challenges. These include the natural resources of its territory; the cultural background of its populations; the history of its processes of formation as a country; the level of advancement and dependence on technologies; and the very ways in which economies are intertwined. These all shape what we understand as its level of development. This is based on the fact that humanity is moving in the direction of what we understand as progress, which implies a desirable well-being for all of humanity.

In this regard, we are convinced, along with Ph.D. Toledo, that collaboration and knowledge sharing among nations play a fundamental role in achieving these goals. By leveraging experience, best practices, and even lessons learned from the mistakes made by developed and developing countries, innovative solutions can be found to address common challenges and promote equitable and sustainable economic development on a global scale. By adopting a holistic approach to economic development, nations can foster an enabling environment for innovation, entrepreneurship, and social progress.

The creation of supportive policies in strategic areas will contribute to the creation of resilient economies. Furthermore, promoting social inclusion, gender equity, cultural diversity, and combating systemic inequalities will ensure that the benefits of economic growth are shared by all segments of society.

By working together, nations can build a more prosperous and resilient world, where economic progress is accompanied by social well-being, environmental stewardship, and the promotion of human dignity. Such a world is not only desirable but also achievable through the collective efforts and joint action of nations around the world. With determination and dedication, a future

can be created in which economic development paves the way to a better and more sustainable world for all.

By focusing on sustainable economic development, countries can lay the foundation for long-term prosperity and shared well-being. This requires a deep understanding of the factors that contribute to economic growth, as well as the potential challenges and opportunities that arise along the way.

Through collaboration and knowledge sharing, countries can learn from each other's experiences and find innovative solutions to common challenges. By adopting a holistic approach to economic development, nations can create an environment that fosters innovation, entrepreneurship, and social progress This includes promoting investment in research and development, education, infrastructure, and sustainable resource management. It also involves addressing social inequalities, promoting gender equality, and preserving cultural diversity.

Sustainable economic growth must go hand in hand with social well-being, environmental stewardship, and the protection of human dignity. This requires a collective effort and a shared commitment to creating a future in which economic development leads to a better and more sustainable world. ¿But how then can we assess and measure the factors that enable this development?

Considering the diversity of factors that characterize each country, we also recognize how economies and development are strongly intertwined by the dynamics of the internationalization and globalization policies that have prevailed throughout recent history. This is where indicators that allow for the evaluation and comparison of development between nations became necessary, particularly in the second half of the 20th century. But undoubtedly, at the end of the century and into the 21st century, amid the cybernetic revolution, new forms of production, and the emergence of new poles of global development, it is essential to review and propose new ways of assessing and comparing development between nations. This is especially true when political and ideological narratives tend to construct "post-truths" that prevent societies themselves from evaluating, as citizens, the performance of the state policies that apply to them.

This is where Dr. Toledo's work becomes invaluable. The proposed construct of the Economic Development Index (EDI), which, after a critical and exhaustive review of the role and operating dynamics of the various indicators

that have been used, is proposed as an alternative that enables a holistic view of the factors that influence development from a comprehensive perspective.

The new economic development indicator presented as a proposed construct serves impeccably and exquisitely as an extremely critical, indispensable, and essential complement to the extensive and current set of indicators used to analyze, evaluate, and scrutinize social well-being. This indicator promises to revolutionize and transform the way economic development is evaluated and understood, paving the way for more efficient decision-making, targeted interventions, and inclusive growth strategies.

Using this revolutionary new economic development indicator, the results obtained from its application will set the tone for generating knowledge, identifying existing problems that hinder each country's development, and modifying the strategies that drive it.

The construction of the new indicator proposed by Dr. Toledo serves as a valuable addition to the existing theoretical discussions surrounding the proposed economic development indicators addressed in his analysis. The formula presented for estimating this economic development indicator is versatile and can be effectively applied in diverse settings, encompassing both developing and developed countries.

Furthermore, it offers a deep understanding of economic growth and progress, enabling policymakers and researchers to make informed decisions and strategies for sustainable development. In addition to its global relevance, the formula can be adapted accordingly to different economic systems, whether capitalist or socialist, or to any economic model, due to its practicality and the combination of indicators used, which ensures its implementation and adaptability.

By incorporating this innovative indicator into economic analyses, a new realm of possibilities and knowledge is unlocked, bridging the gap between economic theory and real-world applicability. The expanded text demonstrates the immense value of this new indicator, as it provides a comprehensive framework for assessing and monitoring economic development on a global scale.

In addition to formally estimating the indicator's value, the proposed formula can also be used in practical settings to generate intuitive and illustra-

tive judgments about economic progress over various time periods, in different sectors and/or nations.

The expectation is that the new indicator, as configured, will provide valuable information about the indicators that need to be monitored to unlock the economic development of the country in which the formula is applied.

By examining the constructed indicator, one can not only form a formal estimate of its value but also apply it to real-life situations to derive intuitive and illustrative judgments about the country's economic progress over different time periods and sectors.

By leveraging the strength of its natural resources, investing in strategic sectors, and participating in collaborative partnerships, every country aspires to become a global leader in sustainable development.

The application of an Economic Development Index allows for the study of other aspects of development, comparisons between them, and identification of differences when designing public policies to have a positive impact on its population. And of course, the proposal stipulates that the way in which the importance of the different dimensions of an index is determined must also include a monitoring system over time to observe how each dimension evolves. For this monitoring system to be successful, methodologies must be developed that allow for the production of data that can be monitored periodically.

We are certain that the journey undertaken by this bold and well-aimed proposal will not be without obstacles in its implementation and development. But with determination and a clear vision, I am confident that it will become a valuable tool for every country to assess and visualize its development challenges and be prepared to overcome them and move toward a brighter and more prosperous future as a lasting legacy for future generations.

Dr. Marco Antonio Zamora Antuñano
Level II Member of the National System of Researchers
of the Secretariat of Science, Humanities,
Technology and Innovation of Mexico

I.

Objective, research approach, and construct development

In the current economic landscape, the construction of a simple and reliable economic development indicator is absolutely necessary, as current economic activity and growth are no longer mere changes in production volume but now involve multifaceted transformations within a nation's socioeconomic fabric. Furthermore, it is becoming increasingly evident that a better statistical method can mask some of the adjustments that negatively affect an economy, making it necessary to develop a development metric that encompasses the entire spectrum.

It is well known that increasing per capita income or accumulating more resources does not always guarantee greater development or well-being for a country's children, and the economy serves as an indispensable instrument for improving the overall well-being of a nation's citizens.

Precisely because of these considerations, over the past decade, nations around the world have begun to realize the inadequacy of conventional macroeconomic indicators, such as GDP per capita, to accurately reflect their progress or, rather, the tangible benefits of various economic activities for their citizens.

The importance of this realization cannot be overstated, as it forms the very foundation of a prosperous society. In practice, it has become evident that perceptions of development differ among individuals, organizations, governments, and even among different members of the population within the same country. Therefore, for an economic development indicator to positively influence incentives and resource allocation in any social and economic initia-

tive, it must not only encompass a comprehensive view of society's progress and well-being but also possess certain key attributes.

These necessary characteristics include, but are not limited to:

1. Reflect the development of a society holistically, carefully considering all dimensions of well-being, progress, and inclusive growth. This involves not only evaluating economic indicators but also considering the social, environmental, and political factors that contribute to a country's overall development. A comprehensive development indicator should take into account factors such as education, healthcare, equality, environmental sustainability, and governance, among others.

2. Evaluate the effectiveness and impact of a wide range of social and economic policies, shedding light on their relative superiority or inferiority and thus serving as a catalyst for necessary reforms and improvements. This requires a rigorous evaluation of policies to determine their impact on various aspects of development. It should be assessed whether policies are effective in promoting inclusive growth, reducing poverty and inequality, fostering innovation, and ensuring sustainability. By identifying policy gaps and areas for improvement, a reliable indicator of economic development can guide policymakers to make informed decisions that improve society.

3. Provide non-governmental organizations with a solid foundation for engaging in meaningful dialogue with development funds and policymakers, thereby ensuring that the diverse needs and aspirations of society are adequately addressed and met. NGOs play a crucial role in advocating for the rights and well-being of marginalized and vulnerable groups. A robust economic development indicator should provide NGOs with reliable and comprehensive data to support their advocacy efforts and enable them to engage in informed discussions with policymakers and development funds, influencing policymaking and resource allocation to effectively address society's needs.

These vital conditions must serve as guiding principles for any nation or organization aspiring to develop a truly reliable and robust economic development indicator. Only by establishing such a mechanism will we be able

to comprehensively assess the well-being and progress of our societies and, consequently, make informed decisions that promote sustainable development for the integral improvement of all citizens, both present and future.

The path to achieving a comprehensive economic development indicator is not easy, as it requires a careful balance between the various dimensions of growth, well-being, and progress. However, with determination and dedication, it is within our reach to create an indicator that captures the complexities of our modern economies and reflects the aspirations of our societies.

Such an indicator would not only guide policy decisions but would also serve as a practical tool for measuring the impact of development initiatives, allowing us to redirect resources and efforts toward areas that require attention and improvement. By embracing the complexities of economic development and recognizing the diverse factors that contribute to social progress, we can forge a future where growth is inclusive, sustainable, and beneficial for all.

Therefore, it is necessary to design a comprehensive economic development indicator that incorporates the values of equity, sustainability, and shared prosperity. In this way, we can build economies that not only prosper but also ensure the well-being and dignity of every individual, ultimately creating a better world for future generations.

My interest in developing a comprehensive economic development indicator stems from extensive international work on economic development indicators and is motivated by long-term changes in the national and international economy. This interest has been further fueled by the recognition that economic development is no longer just about catching up or remaining competitive, but rather about thriving in a rapidly evolving global landscape.

After World War II, Europe's primary objective was to catch up with the most developed nations. However, the dynamics changed after 1990 with the digital, cyber, and technological revolution, and now the focus is on remaining competitive or even becoming a leader on the global economic stage. This shift in priorities was catalyzed by the emergence of newly industrialized countries, which posed unprecedented competition to traditionally industrialized nations.

Adding complexity to this already intricate system, the world is no longer divided solely into two economic blocs, but now comprises four distinct

geographic groups of countries wielding roughly equal socioeconomic power. Each of these groups faces a unique set of challenges and opportunities.

Ensuring sustained economic growth while simultaneously increasing natural resource efficiency, social equity, and ecological security has become the need of the hour. These decoupling measures are essential to achieving a delicate balance between economic progress and sustainability. If these strategies are successfully implemented, countries can achieve the sustainable development goals and avoid the risks of unbridled growth, as occurred in China in the 80's and 00's.

In this context, it is imperative for each country to assess the magnitude of the direct and indirect forces at play through real-world examples. Understanding the complex interplay between economic factors, social dynamics, and environmental considerations is critical to designing effective policies and strategies that promote holistic growth.

The construction of a comprehensive indicator of economic development serves as a tool to measure the progress of nations in their pursuit of sustainable economic growth. Furthermore, taking into account regional disparities, cultural factors, historical contexts, and the changing nature of the international economy provides a more nuanced understanding of the challenges and opportunities facing different nations.

By assessing a wide range of indicators—such as Gross Domestic Product (GDP), employment rates, income distribution, environmental performance, social well-being, and technological innovation—countries can track their performance and identify areas for improvement. Furthermore, taking into account regional disparities, cultural factors, historical contexts, and the changing nature of the international economy provides a more accurate understanding of the challenges and opportunities facing different nations.

Ultimately, the goal is not only to measure economic growth, but to ensure that it is inclusive, sustainable, and beneficial to all. By continuously monitoring and adjusting strategies, countries can navigate the intricate web of national and international economies, creating a path toward shared prosperity and a prosperous global economy.

The expansion of economic development indicators reflects global recognition of the need for inclusive and sustainable economic growth. By adopting a comprehensive approach, countries can monitor their progress, identify areas for improvement, and design strategies that foster their comprehensive development. This is partly one of the objectives of this research.

By expanding economic development indicators, they can also better assess their progress, identify areas for improvement, and design effective strategies that lead to comprehensive and inclusive development.

The purpose of an economic development indicator, especially in a multi-sector economy, is to provide a comprehensive assessment of the speed and level of economic development and the people involved in it, as a measure of human well-being. We economists broadly believe that the development indicator will be immensely valuable to policymakers, government agencies, and research institutions seeking to analyze and understand the intricate differences in the economic development of countries, entities, regions, and/or municipalities.

This comprehensive assessment tool helps capture the intricate nuances of economic progress, considering various factors such as social structure, market dynamics, government policies, and institutional frameworks. By encompassing a wide range of variables and indicators, the indicator facilitates benchmarking and comparative analysis across regions or countries, thus promoting healthy competition, knowledge sharing, and innovative approaches to economic development.

The construction of a robust economic development indicator plays a vital role in understanding, monitoring, and guiding the progress of sectors in a multi-sector economy. Through its multidimensional lens and holistic approach, it fosters equitable, sustainable, and inclusive growth, ensuring that no entity or community is left behind on the path to development and prosperity.

In this regard, the construction of the economic development indicator aims to:

- promote economic analysis,

- provide input to predict and forecast the level of progress of the indicators and the inherent differences between them, and

- support the Development Plan developed by governments to encourage and foster the achievement of the overall objective of sustainable and inclusive economic growth.

Currently, the availability and accessibility of real and accurate data that can accurately and comprehensively measure economic development is of utmost importance to overcome and address the limitations and shortcomings of early indicators typically and commonly used to assess and evaluate the state and trajectory of the economy.

This ensures and guarantees that the indicators can be safely and reliably relied upon to accurately and authentically reflect and display the diverse and multifaceted characteristics, features, and nuances of development.

In assessing the work and performance of a government's objective, a meticulously and methodically designed economic development indicator will be a flexible, adaptable, and versatile policy tool, as it can be employed and utilized effectively and efficiently in a wide variety of economic conditions, scenarios, circumstances, and stages of development.

It is highly and uniquely applicable, relevant, and pertinent to developing regions, underdeveloped areas with immense potential for growth and progress, as well as to mid- and fully developed regions seeking to sustain, maintain, and further enhance their current level of economic development and growth. To construct this innovative indicator, called the Economic Development Indicator, a meticulous methodology consisting of five distinct stages will be employed.

- First, it will be imperative to thoroughly identify and analyze the intricate interactions that exist between various economic, social, and political variables within the respective countries. This analysis will involve an in-depth examination of the historical context, prevailing economic structures, cultural dynamics, and political systems. By understanding the complexities and interconnections of these factors, the indicator will be able to capture a holistic picture of a country's development.

- In the next stage, principal components analysis, a robust statistical technique, will be used to carefully select a precise set of variables that accurately capture the multifaceted interactions identified in the previous stage. This statistical analysis will involve a thorough examination of a wide range of economic indicators, such as Gross Domestic Product, Genuine Progress, income distribution, employment rates, trade balance, well-being, science and technology, happiness, poverty, demographic aging, human development, and many others of equal and lesser importance. In addition, social factors such as educational levels, accessibility to healthcare, and social welfare programs will be considered. Furthermore, political variables such as governance, political stability, and institutional strength will also be assessed. Through this rigorous selection process, the indicator will be able to reflect the nuanced complexities of a country's development landscape.

- In the third stage, operationalization, it is essential for the uniform handling of figures that the selected indicators fit the same data range, so that the resulting Economic Development Index is reflected as a percentage.

- In the fourth stage, a case study of Mexico 2015–2024 will be conducted to demonstrate the usefulness of the designed construct prospectus; and,

- In the fifth stage, to support and validate the designed construct prospectus, independently of statistics and mathematics, a graphical representation will be created to observe the construct's viability.

In statistics, a very important element is knowing how the data compiled from continuous variables are distributed on a Cartesian coordinate system, using the Gaussian Bell curve for this purpose.

Statisticians such as Carl Friedrich Gauss realized this and promoted the construction of a curve that bears his name and is formed as a new analytical tool for data processing.

When the Gaussian Bell curve is divided in half by an axis of symmetry, it coincides with the mean, mode, and median values of the discrete variable.

On this curve, the points where it changes from concave to convex or from convex to concave are called inflection points. At these points, when projected along the axis according to the data distribution, it is found that the distance between the value where the inflection point coincides and the mean is equal to the standard deviation (the standard deviation is a measure of the variation of the data in the measured sample).

So, in addition to this information, we also know that the curve's extremes are asymptotic at the end because there is always a data point that reaches one of the extreme values.

It is also known that when the curve is delimited by the inflection points and a range is adopted where the mean is measured and the standard deviation is defined, the area enclosed within the curve is equivalent to 68% of the curve. When the range is extended to two standard deviations, the area of the curve within that range is approximately 95%. When the range is extended to three standard deviations, 99.7% of the curve is completely covered by that range.

This information is useful in many areas, since it can determine inference issues and the probabilities of Type I errors, but it could also have a more pragmatic use.

The important thing is to determine the normal values, which are constituted as ranges, for each of the proposed indicators. These normal values, constructed using the Gaussian curve, determine 95% of the population. Therefore, the distribution of the data reveals how the data behaves based on the ranges. This will give us an idea of whether the data are extreme and suggest the need to modify economic policy, if applicable.

This methodology, in addition to graphing all the proposed indicators and those formulated in the formula designed to obtain the Economic Development Index, allows us to identify the variables that need to be modified to achieve a closer approximation to the means and standard deviations of each of them. It also allows for comparing and positioning the political and economic strategies of countries with the same economic models or systems.

I emphasize that this methodological procedure is not applicable to making comparisons between different economic models (social liberalism, neoliberalism, Mexican humanism, etc.) or economic systems (capitalism,

socialism, etc.); rather, it is intended to identify areas that are hindering development and to be able to reorient strategies. This could be an annual exercise or one corresponding to a fiscal year.

By discerning causality and interaction between variables, weights will be strategically assigned, enhancing the accuracy and reliability of the Economic Development Indicator. The assigned weights will be adjusted iteratively through multiple rounds of sensitivity analysis and/or ranking, ensuring that the indicator remains robust and adaptable to changing dynamics.

Undoubtedly, this forward-looking approach to constructing and implementing the Economic Development Indicator will significantly contribute to the comprehensive understanding and assessment of a country's level of development.

By covering a wide range of economic, social, and political factors, this indicator will provide invaluable information and serve as a reliable tool for policymakers, researchers, and analysts seeking to promote sustainable development and progress within nations.

Furthermore, it will help researchers conduct comparative analyses across countries and identify best practices for achieving inclusive and equitable development, and assess political variables such as governance, political stability, and institutional strength.

With its robust methodology, comprehensive framework, and strategic weighting, the Economic Development Indicator will be at the forefront of development measurement and assessment, guiding nations toward a prosperous and sustainable future.

Political variables such as governance, political stability, and institutional strength are also assessed. Through this rigorous selection process, the indicator reflects the nuanced complexities of a country's development landscape. The final operationalization stage involves assigning weights to the selected variables. By strategically assigning weights, the accuracy and reliability of the Economic Development Indicator are enhanced.

These economic indicators, by their broad and comprehensive nature, provide a powerful means and mechanism to reliably infer, extrapolate, and measure the potential outcomes, consequences, and ramifications emanating

from different economic development models, frameworks, and approaches, as well as to facilitate and enable rigorous and robust comparative analysis and assessment of different regions, countries, and nations around the world.

Therefore, in carefully and diligently determining the crucial and integral variables to meticulously incorporate, synthesize, and amalgamate in the construction and formulation of this innovative and revolutionary economic development indicator, it was necessary to select core, fundamental, and salient variables that possess a strong, empirically and theoretically substantiated association, link, and correlation with accelerated levels of sustainable, inclusive, and comprehensive economic advancement, progress, and prosperity.

It is imperative to highlight the importance of continually re-evaluating the index's suitability and effectiveness in capturing and reflecting the ever-evolving dynamics and complexities of the contemporary socioeconomic landscape. As the world progresses, economies transform, and societies adapt, it is crucial to adapt the index accordingly to ensure it remains an accurate and powerful tool for analyzing and understanding the multifaceted aspects of economic development.

For that reason, regular updates and improvments base don rigorous empirical analysis, theoretical advances, and global trends are essential to maintain the index's relevance, credibility, and usefulness.

This ongoing process of evaluation, recalibration, and improvement ensures that the index remains an invaluable resource for policymakers, researchers, and practitioners in their pursuit of sustainable, inclusive, and equitable economic progress.

Ultimately, by striving to meet these goals, innovation and refinement of the economic development indicator contribute to fostering a better future for nations and societies around the world.

From the indicators analyzed, the following were selected: the Gross Domestic Product Index, the Genuine Progress Index, the Global Innovation Index, the Human Development Index, the Happiness Index, and the Gini Index.

II.

Key concepts of economic development

Economic development, in addition to being quantitative, also abounds in qualitative aspects. As some have stated, the first is "the expansion of real possibilities," which is synonymous with the economic process: initially, countries and individuals have limited opportunities; as progress is made in realizing and utilizing these opportunities, intellectual and moral growth is associated with them.

As options increase, so do opportunities; movement in these directions constitutes development. As can be deduced from the previous text, economic development is undoubtedly a complex and even ambiguous concept.

For all these reasons, it is worth summarizing it by adopting a simple formula, which in reality is not so simple, since it requires working with each of the variables:

(i) Development is synonymous with progress;

(ii) Development is movement, it is change, and in economics it implies a "source" of growth or a process of continuous improvement.

In a broad sense, economic development is a process of change in economic and social structures that improves the population's standard of living and well-being. This change entails modifications in the productive base, in income structures, as well as in the system of relationships between individuals.

A fundamental aspect of development is the improvement of the population's standard of living, understood in a broad sense that goes beyond the mere satisfaction of needs and includes freedom of action and the development of capabilities.

However, in economics, the term "economic development" does not have a single meaning. Chronologically, the concept acquired definitions derived from classical economic theories of growth.

The conception of economic development associated with these theories and analytical methods is two-dimensional; it refers to the relationship between economic sectors and the reduction of disparities in per capita income between countries.

From development perspectives, economic development is one of the dimensions of human development, but, above all, the concerns of development economists are centered on wealth creation—economic growth—so that inequalities between poor and rich regions and/or countries are not only reduced.

In short, economic growth is a static concept and development is a dynamic one.

There are several theories of economic development. Among the best known are:

The Harrod-Domar Basis Theory. The Harrod-Domar model hypothesis can be developed by considering a simple circular flow. Society is made up of two groups: workers, who receive wages, and capitalists or entrepreneurs, the owners of machines, factories, and facilities in general, called the capital stock. To illustrate the "model," it is said that the capital stock is created when entrepreneurs reinvest a portion of the profit earned the previous year.

The theory of economic growth seeks to explain a country's growth behavior; therefore, it is fundamentally a dynamic analysis of an economy's behavior over time. Growth is the sustained increase in the quantity of goods and services produced by the economy over time. This increase can be observed from the perspective of income or output, but it is easy to get confused. Economic growth is not the same as economic development. Economic development also includes a change in the economic structure, an improvement in inequalities, and greater access to goods and services for society as a whole. For a country to enjoy well-being, its citizens must have some degree of economic freedom, because in such a situation, they will have a choice, rather than being poor and supported by the government. They need something like a minimum of economic well-being, so that, by paying attention to their general interest,

they will feel encouraged and strong enough to strive beyond their basic needs toward optimal individual freedom and happiness.

The pursuit of growth is central to economic theory for several reasons. First, economic growth appears to be the key to sustained poverty reduction, at least in economies that ignore balances and imbalances and operate according to the development principle.

Second, the evolution of economic growth rates has demonstrated an exceptional ability to explain the distinct patterns of unemployment rates across the major monetary areas.

On the other hand, generic basic resources are defined as:

- those supplied by nature,

- finished resources that have been processed by the production process without adding additional value, and,

- those that are not subject to free competition.

The stimulation of a country's economic development relies on the adoption and exploitation of new economic spaces, achieving a greater number of physically profitable resources and achieving higher levels of resource use by production factors other than labor.

Human capital is a term that refers to the set of skills, knowledge, aptitudes, and motivations that a person possesses. The higher the educational level, the fewer factors that influence income levels, and the greater the physical and technological capital. This means that mobility within the population can be high, and patterns of immobility due to stratification do not necessarily repeat themselves. Furthermore, each individual is considered a unique case with different possibilities, which means proposing different lifestyles and different strategies to undertake or achieve economic mobility.

Now, what are the areas or sectors that government economic policy favors within what is understood as development?

Basically, the following:

- Industry: This is usually the leading or core sector that the State protects and encourages to generate a substitute for imported manufactured goods.

- Housing: To gain and maintain popularity, the State promotes construction, thereby lowering housing prices and encouraging the establishment of foreign facilities dedicated to building housing developments for people without any financial security.

- Agriculture: To stimulate the country's economy and development, promoting the agricultural structure is essential. To this end, various intervention policies have been designed to influence agricultural income and change the country's agricultural structure.

- Foreign trade: This policy provides significant advantages to exporters, especially those in the industrial sectors.

- Credit and exchange rates: They can be tools to support a country's economic policy. Interest rates can stabilize the exchange rate and reduce inflation. An increase can make investment in bonds more attractive, which could reduce demand for stocks; while, in the exchange rate, a devaluation can make tradable goods more competitive, which, at a given time, could increase exports and economic growth.

- Fiscal and monetary policy: These are tools used to stabilize an economy. Fiscal policy focuses on public spending and taxes, and can help, in addition to stabilizing the economy, protect the most vulnerable, moderate inflation, improve income distribution and opportunities, and invest in infrastructure and key areas such as health and education. Meanwhile, monetary policy focuses on the amount of money in circulation and, in addition to the above, has an impact on economic growth and revitalization.

- Public health. This contributes to labor productivity and cognitive development. It is a fundamental strategy because it improves well-being and reduces health inequalities. To support it, we can promote healthy lifestyles, prioritize equity and promote social rights, and reduce economic stress, among other things.

- Food policy. These are government decisions that impact the production, distribution, control, and inspection of food. They undoubtedly have a significant influence on the population's nutrition, which is reflected in economic growth.

- Tourism. This activity contributes to economic growth by creating jobs, developing new related activities, improving infrastructure, attracting investment, and promoting culture.

- Transportation and communications. These are important for promoting economic growth by connecting people to basic services, generating employment, reducing marketing costs, integrating markets, promoting the mobility of production factors, generating new technologies, and boosting the digital economy.

- Educational and cultural policy. These policies support economic policy by preparing the population for the labor market. The lower the educational and cultural level, the lower a country's per capita income.

- Improving public administration. These policies are essential for improving communication with citizens, reducing administrative burdens, promoting financial inclusion, investing in administrative data collection, allocating resources to social programs, and maintaining social balance.

- Fiscal and monetary policies. These are essential for the development of economies. However, an underdeveloped country presents a whole spectrum of inefficiencies associated with market failures if the optimistic assumptions adopted in classical theory remain unchanged: perfect competition, full mobility of production factors, full knowledge, and the capacity and attitude of monetary authorities, especially with regard to the speed of investment in removing the financial surplus not invested in consumption.

The government has the capacity to directly influence the economy through the allocation of resources. Its deficit or surplus is also said to finance the private sector of the economy through the money supply. Given the impact of public spending on employment, investment, and output, many of its components reside in the power of taxation, for example, to penalize or reward

certain productive and/or distributive behaviors within the economy. Typically (especially under neoliberal premises that question the influence of the state and promote the free market), the Public Treasury should not influence the prices of goods and services, except in exceptional cases, such as with certain maximum prices and specific royalties for producers and/or consumers. It will focus its economic influence on quantities. If it spends more than it earns, it produces inflation; if it withdraws more than its fair share, the economy enters a global recession.

Accumulation models have been clearly eroded since the 1990s by the relocation of manufacturing to Southeast Asia. This has allowed emerging countries and nations the opportunity to find themselves in often more favorable environments. However, this process has not been without its share of situations that have generated considerable controversy.

The evolution of taxation and the increase in public debt is generating a need that many economists consider undesirable: the subordination of macroeconomic policy, and with it, development policies, to the short-term designs of international investors.

The concept of economic development also encompasses the idea of sustainable resource use and environmental preservation. It implies the adoption of practices that minimize negative ecological impacts and promote long-term environmental sustainability. This includes the implementation of renewable energy sources, the promotion of green technologies, and the minimization of pollution and waste generation.

Sustainable economic development recognizes the need to balance economic growth with ecological preservation, ensuring a healthy environment for current and future generations.

Furthermore, economic development can be considered a catalyst for cultural enrichment and heritage preservation. It provides a platform for the celebration of diverse cultures and traditions, fostering social cohesion and mutual understanding.

Economic development goes beyond material wealth and economic indicators. It encompasses well-being in all dimensions of life, including the physical, mental, and emotional aspects. Access to quality healthcare, educa-

tion, and social services are integral components of economic development. Its goal is to create a society in which people have the opportunity to reach their full potential and lead fulfilling lives.

In conclusion, economic development is a multifaceted concept encompassing several dimensions. It involves sustainable growth, social justice, environmental preservation, cultural enrichment, and holistic well-being. By pursuing economic development with a holistic approach, societies can strive for a more equitable, inclusive, and prosperous future for all.

III.
KEY INDICATORS FOR THE CONSTRUCT

The indices that comprise the proposed methodological procedure for constructing the Economic Development Index are: Gross Domestic Product, Genuine Progress, Global Innovation Index, Human Development, Happiness, Gini, and Demographic Aging. They were selected for their complementarity and structurally.

In this sense, the Economic Development Index is intended to reflect the combination of all these variables illustrated in accordance with each economic model or system.

1. GROSS DOMESTIC PRODUCT INDEX

Kuznets, S. (1937) constructed an economic indicator in response to the Great Depression and the United States' need to measure the economic impact of the crisis.

For a long time, the gross domestic product (GDP) has been the primary indicator of economic growth for all countries. However, it has been discovered that GDP has certain limitations and does not fully capture the complexities of social progress. One of the main limitations of GDP is that it considers everything to have equal value, including transactions that do not necessarily contribute to the overall quality of life or social well-being.

This means that both productive and destructive activities are treated as if they have equal value, which can lead to an inaccurate representation of economic well-being.

Among the various economic indicators, GDP is, along with employment and unemployment, the most widely used concept and the one with the greatest predictive capacity. Therefore, it is consistent that output is the

object of study for most empirical methods for estimating potential and cyclical components.

The most traditional approach to analyzing GDP growth is structuralism; output growth is explained based on its main determinants, such as consumption, investment, foreign trade, and public spending.

Models are the basis of a large number of tools whose main advantage is that they do not impose any prior structure on the model, making them easily usable as a prediction tool or for analyzing GDP growth based on different scenarios.

Several authors consider that an essential distinction, synonymous with equilibrium, in the body of economics relates to the concepts of production level and capacity, which are in turn limited by the factors of production: the amount of capital and labor employed, the carrying capacity of facilities, etc. From this perspective, the concept of potential GDP is used when discussing the legacy left by John Maynard Keynes. Potential GDP is an unobserved variable, and therefore, any technique used to approximate it based on observed data is not definitive, and its results are subject to the quality of the data and the model used.

Potential GDP is a fundamental indicator in the design and monitoring of economic policies. It represents the level of output that can be generated when all productive factors are fully employed and used in the most productive way; that is, it represents the maximum output that an economy is capable of generating in the long term. It is, therefore, the level of production that can be generated without putting pressure on prices and the economy's capacity.

If there were no limitations on indefinitely expanding an economy's production, the concept of potential and cyclical production would be superfluous.

When starting from an analysis of the production function that involves the concept of installed capacity, effective production refers specifically to the concept of potential GDP.

It is closely linked to the concept of the output gap, macroeconomic instability, the business and inflationary cycle, unemployment and underemployment, and their adjustment costs.

Consequently, the different approaches followed to determine potential Gross Domestic Product (GDP) are: neoclassical, Keynesian, monetarist, and classical.

Gross Domestic Product (GDP) figures have established themselves as the most relevant macroeconomic measure. They are undeniably at the center of economic policy debates, both in times of crisis and in periods of relative calm.

GDP figures, almost always adjusted for inflation, determine the pace of economic growth and are used to evaluate economic performance relative to other countries. Although too often considered infallible and objective figures, GDP figures are, in fact, largely the product of human calculation, interpretation, and intervention (Mallett & Keen, 2012).

According to Erickson (2019), this raises the question of how well these figures truly reflect economic activity, given the known shortcomings in the concepts underlying the calculations. GDP has become by far the most widely used index for assessing a nation's economic performance, and many consider it the benchmark for comparing economic growth and stability across countries.

There is widespread awareness that this reliance on GDP figures entails a number of problems. These are largely due to the fact that GDP has become the sole policy target, deliberately ignoring the underlying shortcomings of the index itself. Still, a critical assessment of why GDP seemingly fails to sufficiently reflect underlying economic activity is lacking. A political economy perspective sheds light on the broader implications of the gross domestic product index and why it is important to explore its shortcomings.

A nation's gross domestic product is simultaneously the monetary value of all final goods and services produced within a nation's territory during a definable time interval. It is this aspect of production that defines GDP as the product of economic activity.

By design, GDP captures everything that leaves the production process and enters the market. This entails a whole series of inputs, from gross output, value-added aggregates, intermediate consumption, and net taxes on production and imports to a definable range of exclusions. Classical economic theory assumes a set of exogenous economic activities that produce observable and, therefore, quantifiable driving outcomes. Once the driving outcomes are

observed, it is, in principle, possible to reverse the driving force's structural parameters.

In this sense, GDP is considered a direct measure of a nation's productive activity. However, the statistical foundations on which national accounts are based imply that quantifiable economic activities are inferred from the prices of the goods and services transacted, offsetting the influence of the time and resource costs of the activities performed.

The history of GDP is an examination of the social values that determine the criteria for economic success. Economic growth is often considered the primary objective of society, despite overwhelming evidence showing that it is unnecessary and often pernicious.

Traditional economic indicators, such as GDP, were originally designed to serve a particular set of social purposes, which are now often neglected (Felice, 2015).

There are three ways to determine GDP: production, income, and expenditure, and all of them should, in theory, produce identical estimates of GDP, albeit from different perspectives.

The production approach focuses on value added, highlighting the contribution of different activities to GDP; The revenue approach focuses on the distribution of GDP, and the expenditure approach considers the final uses of GDP.

Regardless of the approach used, GDP can be defined as a comprehensive measure of economic activity (Mallett & Keen, 2012). For most countries, what is included in GDP calculations is straightforward: consumption (C), investment (I), government spending (G), and net exports (NX = exports–imports). Taken together, the formula is GDP = C + I + G + NX.

Mathematically, GDP measures the monetized output of the economy, adjusted through various statistical refinements. Hence, it is vital to detail how GDP is calculated to clarify its strengths and, especially, its weaknesses as a measure.

GDP can be calculated and adjusted with three simple mathematical formulations:

$Y(t) = \sum [pi(t)\ qi(t)]$

$Y(t) = \sum [Va(t)]$,

$Y(t) = \sum [\ (yi + ti)]$.

Where:

$Y(t)$ = GDP in year t,

$pi(t)$ = price of good i in year t,

$qi(t)$ = quantity of good i in year t,

$Va(t)$ = value added of activity a in year t,

yi = production of activity i,

ti = tax on activity i, and

t = fu, compensating for the equalities in the tax system.

The summation is performed on the aggregation subindexes: "i" for goods, "a" for activities, and "f" for fiscal/monetary procedures. For the disaggregation index, p is price, q is quantity, and V is value.

The GDP index has faced criticism regarding its ability to provide a holistic measure of well-being. Some argue that it cannot be expected to capture what it was never intended to, while others acknowledge GDP's role in quantifying the market component of the economy but highlight its shortcomings in addressing unaccounted-for non-market activities (Kapoor & Bibek, 2019).

One limitation of GDP is that it does not include the costs of environmental degradation. While GDP can capture economic growth through investments to address pollution, it does not consider the social costs associated with environmental degradation, such as the strategies to reverse pollution. The disparity between GDP growth and environmental degradation indicates the inability of nation-states to counteract such growth.

This criticism connects with concerns about the sensitivity of GDP to social costs that are not taken into account in the calculations. Policymakers

can interpret GDP growth as progress, even when that growth is largely driven by excessive social costs, as was evident during the 2008 financial crisis.

Another criticism concerns the lack of sensitivity of GDP to social costs. Similarly, factors such as rising crime rates, low schooling, and general peace imply an increase in the number of prisons, students in remedial classes, and police forces, reflecting an increase in GDP, despite representing a decrease in well-being.

There are concerns regarding the accountability and inclusiveness of GDP. The substantial naiveté of the current situation lies in the question of how much wealth is appropriated by each social stratum. If a nation-state reports 20 percent GDP growth, it is critical to determine whether the wealth from that growth trickles down to the poorest population.

This lack of transparency explains why it took economists more than half a century to demonstrate that poverty can exist amid growth in which wealth accumulation advances only among a distinct stratum.

The remaining limitations of GDP relate to its inclusiveness and multidimensionality. It can be argued that over a given period, GDP increases or decreases, but these quantitative data are bound to signify progress or decline in the economy only when this happens with unidimensional life indicators, such as longevity, literacy, or infant mortality.

Most of the limitations indicate GDP's ability to do something or be something, while all assessments taken together so far constitute what GDP is not and cannot be: a measure of economic health.

A major shortcoming of the GDP index, which has been widely criticized over the years, is its inadequate measurement of non-market activities that create economic and social well-being. Outside of market transactions, there are countless economic activities that have a major impact on individual and community well-being. However, the GDP index fails to recognize these. Therefore, it can grossly misrepresent or ignore the value of entire parts of the economy (Darkal, 2014).

The most glaring omission from GDP measurements concerns the many forms of unpaid work, particularly women's unpaid care. In almost every

country, there is significant market value for childcare, sick care, elder care, cooking, cleaning, and other forms of unpaid care outside the labor force, most of which are activities culturally associated with traditional, heteronormative gender roles.

On the other hand, the preparation and motivation to participate in the market are social characteristics sensitive to gender and age. GDP early on registered a socioeconomic development that deepened inequalities in the social and educational provision of basic living conditions. Therefore, social reproduction, as a highly non-temporal and non-market activity, is excluded from GDP measurements. It has been shown that around 85 percent of economic value measured over time is not taken into account in GDP.

By ignoring non-trade activities, the GDP index can deepen inequalities in the distribution of social wealth and invisibly underestimate the most important social functions that involve, among other things, caring for the young, the sick, and the elderly.

In short, criticism of GDP incorporates into mainstream economic discourse an increasingly broader acceptance of the need for comprehensive measures that address all forms of economic engagement.

The GDP index ignores the pollution that growth generates and the resources it depletes, even though such practices are obviously unsustainable.

Without accounting for externalities, ecological damage is perpetuated at best, and at worst, structural damage to growing economies is considered, since further degrading growth is growth doomed to fail.

The GDP index fails to account for inclusiveness and how wealth is distributed among the population. The criticism behind this shortcoming is that the GDP index aggregates economic activity without considering how income/resources are allocated (Kiss, 2013).

In other words, GDP figures can grow while wealth distribution becomes more unequal. National averages can hide significant inequality.

For this reason, two countries may show similar GDP per capita figures, while one of them exhibits much greater inequality in income distribution (Felice, 2015).

From this perspective, although taking income distribution into account is essential, this does not mean that poverty should be neglected when accounting for economic activity. In fact, countries may show similar GDP figures despite different income distributions. Seemingly highly unequal countries may even have higher GDP than countries with better income distribution. Therefore, GDP neglects important social dynamics. Poverty, accessibility, the availability of opportunities, and, in general, all aspects that can be related to "social exclusion" are neglected in GDP figures. It is also worth emphasizing that the growing attention to the potential social consequences of rising inequality and poverty is a fairly new issue, closely related to the neoliberal policies that have affected most Western countries since the late 1980s.

It is clear that social equity is also highly relevant in terms of the stability of nations and, therefore, of overall economic performance.

For this reason, in addition to assessing a nation's overall economic performance, it would be preferable to have a measure that can reflect how economic activity is distributed across all income classes.

Therefore, equity is not merely an add-on to the measure of prosperity; it is an element that impacts its definition. Measures that take into account only a nation's overall economic performance, without considering how this performance is redistributed among populations, therefore neglect a fundamental aspect of the concept of prosperity.

This is not to say that, in attempting to reform development measures, issues related to distributive equity should be neglected; on the contrary, the hope is precisely to illustrate the limits of current development indices in accounting for this dimension. Consequently, it would be desirable to reform development measures to ensure that economic measures consistently reflect all segments of society.

While conventional economic indicators face scrutiny for their inadequacies in assessing progress, a multitude of alternative measures have been proposed as complements or substitutes for the GDP index.

Some of these suggested alternatives can complement the GDP index by addressing the shortcomings listed within the GDP framework.

Others could, in principle, replace the GDP index as a measure of progress.

Some economists are exploring methodologies to add these indicators directly to GDP estimates, while others propose creating new indices that adjust traditional measures by adding or subtracting broader indicators. The goal of these innovations is to address the key shortcomings noted in criticisms of the GDP index by incorporating aspects that go beyond quantitative growth measures and also consider the quality of growth indicators (Isogawa & Ohashi, 2011).

Along these lines, there are several proposals suggesting that, by not simply measuring monetary figures, GDP can be transformed into a tool that represents the well-being of society.

Nevertheless, a major challenge to the implementation and widespread acceptance of these proposals is the fact that some of the changes are very complex. Therefore, a consensus would be needed on which general indicators should be included and how they should be calculated.

However, the proposals alleviate the frustration surrounding the possibility of an alternative to GDP, particularly some more radical composite indices that would completely replace it, such as the economic development index.

Many potential alternative indices have failed to gain popularity compared to GDP. Therefore, attention is focused on why GDP's shortcomings have gone unquestioned since its inception, despite the "naive" awareness of its shortcomings ever since. Nations are grappling with inequalities in well-being opportunities, which is paradoxical with inequalities in perceptions of well-being. While imperfect, focusing on the temporal convergence of well-being indicators guarantees the well-being returns derived from growth. Countries are converging toward a target well-being state that is continually adjusted by well-being states on growth (Isogawa & Ohashi, 2011). Ultimately, the goal is to foster a collaborative approach to redefining socioeconomic success, far beyond GDP.

There is no doubt that GDP has been misused as a measure of development and well-being. Moreover, it is questionable whether it should continue to be used. Therefore, a possible way forward is suggested by adopting other

measures that take into account society's true desires and that could be made publicly available and easy to interpret.

The simplest option would be to integrate social and environmental indicators into the development of policy frameworks to avoid perverse outcomes or to evaluate decisions that take into account broader effects.

2. Genuine Progress Index

The Genuine Progress Index (GPI) is an approximation that seeks to improve GDP as a measure of social well-being.

This is a macroeconomic indicator that, like the Gross Domestic Product (GDP), attempts to account for economic development by meeting the needs of social agents. However, its calculation introduces a series of corrections that the GDP omits, making the GPI an indicator of the real purchasinºg power of our economic, material, and human capital.

The Genuine Progress Index indicates the country's economic development, but it not only takes into account purely productive aspects of the country, but also others such as domestic work, volunteering, education, environmental improvement, among others; and subtracts from it the aspects considered negative, which are mainly spending on Citizen Security, Health, Unemployment, Inequality, Pollution, and Accumulated Deterioration.

The concept of genuine progress seeks to eliminate the shortcomings of traditional indicators. Indicators must be linked to the concept of well-being, which, despite its vague meaning, can be said to be comprised of both a quantitative and a qualitative aspect. At the qualitative level, the quality of being quantitative is not always reflected quantitatively, unlike the enumeration of achievements. However, there are exceptions.

This approach involves a reduced number of assumptions that generate biases, compared to the methodology of chain indicators, and a continuous adaptation of the index to global changes and individual behavior.

The Genuine Progress Index (GPI) was designed to address a widespread criticism of the use of Gross Domestic Product (GDP) data to measure progress or the well-being of society.

A series of indices closely related to the actions of the administration and the economic and social structure in a given spatial unit that combine, explicitly or implicitly, to give rise to a single value.

The areas that combine to create the GPI are the physical indices that quantify: net damage, ecological footprint, Healthier Planet Index, total economic cost of health damage, government intent, internal gender equality, self-perceived happiness, and ethnic equality.

The GPI, therefore, measures the combined capacity of the economy and society to generate tangible and real well-being. Therefore, the dissemination of the GPI will allow us to rigorously analyze productive activities, that is, to establish the nature of the true progress obtained from all transactions in the economy and whether they, ultimately, contribute as beneficially as assumed to society as a whole.

The idea of the GPI, which combines, for example, factors such as the significantly increased growth in the material standard of living with the decline of the natural environment, has a much older origin, which is worth highlighting.

Based on the ideal of the green economy and the "good," it maintains that an increase in material wealth in turn entails a broadening of the spectrum of ethically desirable goods, also improving growth. This economics proposes an indicator of socioeconomic prosperity based on three types of assets: natural capital, human capital, and manufactured capital. According to this paradigm, existing natural assets and resources have until now been considered unlimited and always available for human development.

Regarding its calculation methodology, the GPI attempts to capture the complexity of the economic system, both from the perspective of its socioeconomic transformations and the use of natural resources and the environmental degradation it produces, without overlooking the role played by the unpaid labor of individuals within a framework of personal equality and the political sustainability of the system.

The GPI model is a system of indicators that attempts to deconstruct social reality and undertake a qualitative approach to the issues of well-being

and sustainability, weighing the contributions and relationships of a broad set of dimensions and their basic elements, with a clear approach and methodology.

At the impact level, the GPI serves as the backbone for the design of public policies and for the country's social development. In the case of the GPI, the main shortcomings found in the literature are the impossibility of obtaining the index in absolute terms of measurement, as there are no concrete formulas to homogenize and compare the marginal rates of attrition in a simple and equal manner for all factors.

The only indices truly comparable with the GPI are the GDP and the HDI. It should be noted that in neither case is a sensitivity analysis performed for the variables included or excluded; therefore, in these specific series, the GPI will be just one of several exercises performed with the variables, along with the GDP and the HDI.

First, we see that GDP has grown faster than the GPI in recent years, and the gap is widening. On the other hand, the GPI has not played a stabilizing role in the crisis, as will be explained later.

Therefore, the GPI can be an interesting indicator of how the minimum level of social well-being could grow, but to understand how well-being itself grows relative to our environment, it is necessary to look for other qualitative arguments.

The GPI is designed to measure the genuine progress of an economy, incorporating environmental and social aspects to the extent possible and quantifiable. However, there are a number of limitations to the GPI, as there have been data that could not be quantified and for which estimated values have been used, with the consequences that this has on the variation in the data. At the production level, environmental aspects have been included for which not all studies agree on their negative impact, so it would be more appropriate to consider them in production costs.

The index does not take into account non-monetary factors that economic activity may generate, and in this sense, the main risk is the failure to take into account secondary effects, which can be positive or negative for production or consumption.

In analyzing the limitations of the GPI, it must be taken into account that it is the result of an entire econometric process that encompasses economic, social, and environmental aspects.

However, in the synthetic analysis of a problem with as many facets and links as analyzing a country's material-energy evolution relative to itself, the econometric analysis and the various alternatives used in the exercise are based on a series of premises that may call into question the robustness of the results derived from it.

Future projects to calculate this indicator should consider six novel aspects, their marginalities, and how they imply assuming and surrendering part of the reality that surrounds us:

- Consumption linked to the informal economy, which would be the volume of well-being not officially computed ("official" goods and services not acquired).

- Material flows, pollution, and technological development; The blind spot of the GPI, in its calculation aspect and at the reference time, 1990, was that it excluded physical problems of technological change in agriculture.

- Past exclusions that, however, according to the first order, would have been compensated for or incorporated later: storage, durable goods, and an increase in "direct social services" linked to education.

- The effect of defense and repression spending, and the declaration of legitimate versus useless spending, on well-being.

- The measurement of intangible capital and the obtaining, not elimination, from the index itself of a nebulous sweep of culture, of true "internal content" owned by outsiders, impostors.

- In original relation to previous ones, the present day of final value, contemplation of the "reprehensible," etc., which does not affect (or affects less) the well-being of citizens.

On the other hand, there are several types of potential biases that could influence the GPI results. One of them is related to the assumption that CO2

production is proportional to the Exponential Moving Average (EMA). Another possible source of bias is the GPI's orientation toward the transition to a low-carbon economy, assuming that low-carbon economies will produce a low EMA. Or, the assumption that a zero EMA suggests the real nonexistence of the problem, since we currently have the production capacity. These assumptions are debatable, given that GDP has a differentiated relationship with each country's emission rates due to different levels of efficiency.

Another premise is the inference of a gap if GDP is greater than the optimal η, or vice versa if it is lower, caused by assumptions about changes in welfare functions.

A problem associated with the GPI construct is the presentation of construct validity and ecological validity. Since it is based on linkage matrices, there is no justification for either the statistical component or the content of the assessment of the partner country's progress.

One more factor that can generate bias is the somewhat arbitrary calculation mechanics, given that, for example, the logit (logistic unit) is not the only method for interpolating observed values.

Another assumption on which the Index is based is that, as an economy increases its production, real GDP per capita decreases; this assumption is debatable, since not every degree of excessive production is necessarily associated with a deterioration in the well-being of the population of the encircled country.

And additional problematic factor is the inclusion of theoretical values that limit the space of the various large increasing and small decreasing functions, forming a large, elongated utopian frontier, artificially closed to the observation point, where one would instead present a smaller, less-adjusted line oriented toward the error. This large frontier is assumed to be formed by economic and ecological optima based on climatic and biomass observations given a given technology, production structure, and ecology.

The GPI offers an alternative to the usual approach to progress based on GDP per capita. The use of well-being indicators (education, health, income, employment, environmental protection, etc.) is more in line with Spanish commitments and international trends. The use of a monetary measure for a

different purpose is based on a false ethical conception. We therefore review four ethical foundations and outline their most direct implications.

A just society is one that ensures the highest level of well-being so that individuals impose the least burden on others. This idea is common to all contractual approaches.

Most of society, except for the most vulnerable groups, under normal conditions, can achieve its own well-being without harming the well-being of others. This consideration is fundamental because it means that not every act that benefits the person who performs it automatically harms another.

From an economic perspective, citizens must be considered rational individuals, that is, as members of the community who know what is best for themselves, who use the means available in the market to achieve their ends, and who are therefore capable of making their own decisions.

Our attitude as consumers is affected by complementary sources of information. We will be more critical of decisions based on the mere accumulation of wealth if they bring us less happiness.

Well-being indicators provide us with information about the consequences of individual or collective decisions made in other areas (work, family, personal development). This corrective nature is essential. From the perspective of long- and medium-term planning, well-being indicators should be our allies in designing future scenarios that bring us as close as possible to what we want to be or achieve.

After all that has been said, one can argue that the debates surrounding equity and social justice originate precisely from the shortcomings of GDP, both in its theoretical definition and in its calculations.

To the extent that income distribution becomes more equal, it will tend to become more equitable. It is possible to reach an international consensus, since, generally speaking, an excessive gap between rich and poor is undesirable. However, it is based on the different conceptions of what is fair and what is considered truly valuable that different authors begin to base their arguments and position their proposals.

When raising this question, another question inevitably arises: Justice or equity for what? Depending on how this is answered, more inclusive approaches will be achieved, with a greater capacity to anticipate the disparities that may arise from their implementation.

The introduction of new economic, political, and social variables into the Genuine Progress indicators is detailed in the study, which assesses the importance of considering the conditions necessary to achieve decent housing. An optimal Genuine Progress indicator for member countries is determined based on the relationship between income and Genuine Progress up to a given level of GNI (Gross National Income) per capita, which would not necessarily translate into additional Genuine Progress.

The key economic indicators and metrics for the calculation are: intermediate consumption in non-energy sectors, investment in capital flows and stocks, flows of non-market goods and services, water, air, and soil resources suitable for satisfactorily fulfilling the various life support and relationship functions, including renewable and non-renewable resources at first glance per unit of surface area up to a limit, and the value of natural capital produced and managed among expected resources.

Key indicators and metrics related to social variables that have a quantitative influence on the calculation of Genuine Progress are: life expectancy of newborns, income equivalent for a fair social distribution, educational assistance not measured in the costs of formal education, hours spent per person proposing, participating, voting and following local life, and monthly schedules of those from the non-market economy.

As in the previous case, the Genuine Progress indicator calculated from the welfare function will project a negatively sloping logarithmic function into the future for higher than optimal income values, with income decreasing as Genuine Progress is achieved.

Regarding the Genuine Progress formula, there are different versions:

$P = R + A$.

Where:

P–Progress or Total Income,

R–Income provided by natural capital and labor income,

A–Services provided by labor.

P = CON + IN–EF.

Where:

P–Genuine Progress/net welfare increase,

CON–Apparent net consumption of natural capital,

IN–Income from property factors of production net of depopulation,

EF–Damage and disinvestment.

The 2008 report of the Commission on the Measurement of Economic Progress and Social Well-being highlighted the problems with the theory of economic growth as it has been constructed, given that it assumes four aspects that make it difficult to conceive of a growth that provides tools for achieving progress in a broad sense.

On the one hand, it assumes that the size (volume) of the economy translates into well-being, when the negative externalities generated by modern economic growth have negative consequences for the planet, which is called unsustainable growth.

On the other hand, it assumes uneven growth that will force economies to follow different paths within the same model, which lays the groundwork for considering inequality in the evolution of income and economic impacts.

In short, when there are no significant impacts, or when they exist and are effectively mitigated, life in nearby communities appears to be positively affected, as their growth and ties with the company generating the impact are, respectively, favored.

3. Global Innovation Index

We live in a globalized reality in which countries must have a global vision to compete on equal terms in the global market. All highly competitive countries have made significant investments in innovation to improve their ability to compete in a global market. This innovative force and its equivalent capacity to generate new wealth are contained in one of the most important

drivers of the dynamics and evolution of countries with the greatest development capacity: the innovation process. Understanding how the different indicators that make up the Global Innovation Index behave will help us develop a strategic quality management plan that generates progress and competitive advantages, comparing them with the evolution of our competitors and international benchmarks.

But we cannot forget that the Innovation Index is not all positive; it also informs us of our country's most deficient aspects and the outstanding tasks we must address to become more competitive.

Investment in research and development, the creation of technology, and the expansion of innovation are three of the recommended strategies for countries at different points in the development process.

One tool that allows for evaluating and comparing the efforts of different countries in this regard is the Global Innovation Index, published by the World Intellectual Property Organization. The most recent version uses 84 indicators grouped into 81 variables, allowing it to develop the index for 142 countries.

It can be established that the purpose of the GII is to develop, update, and validate an instrument for measuring and evaluating institutional quality for knowledge governance, for the generation of public policies that reduce the gap between traditional productive sectors and knowledge-based goods within the institutions of a specific environment, supported by the knowledge governance paradigm, and ensuring its validity through the conceptualization of a set of indicators.

The Global Innovation Index is calculated using two sub-indexes: "Inputs" and "Outputs."

The first refers to Institutions, Human Capital and Research, Infrastructure, Market Sophistication, and Business Sophistication.

The second refers to the Production of Knowledge and Technology and Creation of Results.

The Global Innovation Index is calculated as the weighted average of the two sub-indexes. The results are normalized to establish a score of 0–100 for each country.

The GII has been calculated annually since 2007 and is based on 80 indicators: 64 quantitative, 11 composite, and 5 qualitative.

The GII analyzes four different criteria to establish the ranking:

- Investment in science and technology.

- Technological progress.

- Level of adoption of new technologies.

- Socioeconomic impact.

The co-editor of the Global Innovation Index praises the evolution of this indicator, according to his explanation gathered at the World Economic Forum: "We have been very impressed with the GII, which inspired us to develop the Global Innovation Index." "It is a highly innovative index," he concludes. "It has motivated us to do our best and continue its publication year after year." Its authors state that the IGI seeks to reflect a more precise view and encourage a proactive approach to the issue and the role of countries, encouraging governments to innovate and differentiate among different country segments. Furthermore, the work will aim to foster collaboration with a range of institutions with strategic expertise and better align their global R&D and innovation activities.

In this context, the analysis of the economic and innovative performance of countries and regions is essential for public policy and business management. This analysis is based on the use of synthetic or composite indices, which summarize an entity's innovation and also allow for the assessment of its progress over time.

Worldwide, the Global Innovation Index is the benchmark indicator of countries' innovation capacity. The methodology used to develop this index is a mixed one, utilizing both composite indicators derived from various simple indicators and information from surveys of more than 140 countries, giving it proven reliability.

Ultimately, the GII provides us with a comprehensive view, over the last decade, of countries' performance in the field of innovation, both globally and in economies with similar environments. Using the GII allows us to

compare the performance of our region and, in turn, compare our practices with those of other advanced countries, thereby providing a benchmark for our performance and identifying our areas of opportunity.

Regarding the shortcomings of the Global Innovation Index, critics have cited methodological weaknesses and technicalities regarding the measurement of robustness, complexity, and futurity. Furthermore, there is confusion about how implementation effectiveness is assessed.

Some suggest that the codependency of selected indicators, such as different price levels in the "Global Innovation Index," would actually underestimate the impact of innovation on the product or process or on intra-sector margins.

Indicators expressing costs and product and process improvements to capture availability and competitive and prospective potential are also not included.

Furthermore, the opacity of some of the concepts used leads some critics to question the facial validity of the underlying indicators. A good example is the growth of the market rated based on achievements for the high-tech industry.

Over the past few years, the Global Innovation Index (GII) report has been gaining ground in importance. In fact, to date, it is the most comprehensive and rigorous document analyzing the factors that help a country improve its innovative capacity.

The infrastructures included in the Global Innovation Index are: regulatory factors, financial factors, market factors, physical factors, technological factors, and research factors.

In the Global Innovation Report, the factors considered by the Index at a global level are presented in seven pillars. The quality level of each pillar is measured through a set of variables considered in each: it measures either 100% (quality), the remaining percentage contributed to quality, the absolute standard value associated with a given product or service, the average weighting of different quality benchmarks, or the variable has no influence. The seven pillars measured by the Global Innovation Index are as follows:

At the international level, Chile achieves a Knowledge and Technology Transfer indicator of 0.006. I attribute this weakness to strict policies governing this issue in education, the purchase of patents from abroad, and other aspects related to education and innovation. One example is the creation of the MatBPOC Platform, an online meeting site that seeks to foster collaboration and co-creation between researchers and companies in the Chilean mining industry by indexing problems or challenges of high value to the industry and by making available the scientific and technological knowledge and capabilities represented in publications from the scientific, technological, and industrial ecosystem.

The endogenous growth model represents a meeting point between neoclassical and realist growth theories. Neoclassical theory proved unable to explain much of the real growth of economies: the growth of modern economies cannot be constant in the long term due to the diminishing returns to capital investment. There is no stable relationship between capital and the standard of living: for example, we saw how the standard of living of countries did not show much correlation with the employment-capital ratio. Modern economies did not grow much in capital, but they did create wealth and knowledge.

Innovation has a quasi-public nature, which eliminates the possibility of private appropriation, which in turn eliminates private incentives to innovate.

Endogenous growth theory considers that economic growth can come from endogenous market factors that are not explicit in the model's assumptions. These endogenous factors stem primarily from the dynamic nature of entrepreneurship and the impact of innovations on the market.

Markets are not abandoned spaces; they are evolving. From small advances to innovations that each agent incorporates into their daily activities, they are rooted in the effort to improve and grow. Each of them is allowed this growth or improvement depending, among other factors, on the profit they achieve.

Each agent or group of agents does so from the point where other participants have left off, with the initial intention of generating an advantage over those involved to appropriate part of the resources generated in order to

continue improving in the future and thus ensure their survival and viability in the economic world.

Quality of life can be addressed in many ways, beyond purely economic factors. It is important to note that, in addition to the existence of economic opportunities, there are opportunities that are generated or lost depending on the quality of the environment, urban or rural, and the opportunities to establish relationships that foster a sense of well-being.

Thus, I consider that the impact of the possibility of change and the simplicity of executing it on the quality of life can be stated in the opposite way to what is traditionally associated with forced displacement; that is, in a positive way. People suffer when they are subjected to restrictions by those who have force and power over them, but when opportunities for change exist and no source of power exchanges those restrictions for anything valuable, generally people are better able to consider that the rules are not 'fearsome' and the low cost of obedience is not appreciable. Thus, as fear decreases, the impact of adherence to the rules on individual, daily, family and community quality of life decreases.

Economic and non-economic opportunities are, therefore, a more personal aspiration, focused on achieving greater well-being. Consequently, a high quality of life must combine both categories of opportunities.

In a world of rapid and diverse change, where the well-being of all is a priority, with human satisfaction in line with personal and professional ethics, the importance of growth, innovation, development, and improvement of relationships with new technologies and their use as a platform for accessing the greatest diversity of opportunities is evident, adopting an "Emotional Contract" model that fosters connections with organizations and the Information Society.

The Global Innovation Index presents some challenges and limitations that must be taken into account when interpreting the results and their comparability over time. Starting with the 2020 edition, the Global Innovation Index has changed its conceptual framework; its results have not been comparable since the 2019 edition due to the approval of the program.

To this end, the survey and questionnaire they designed provide both quantitative and qualitative information on innovation approaches and poli-

cies, but also suffer from information bias. Indeed, the information collected through the survey is supplemented with objective indicators, which could lead to some inconsistencies in the data, although the results report indicates that the GII Statistics and Indicators Unit regularly verifies significant overlaps or inconsistencies in the information. Compiled from different sources, the GII governing bodies are therefore involved in assisting in the analysis and interpretation of the data, and it is subject to a final verification process.

We must also keep in mind its impact on the economy: it is limited to countries that conduct innovation surveys. Reliability compared to other indices: There is no better alternative for the annual measurement of innovative capacity, but it cannot be compared with variables such as GDP or, for example, inflation; that is, it is not a "hard" economic indicator. There is no evidence of its descriptive predictive value for GDP over time. It is an index whose variables come from surveys, which are subject to interpretation. In this regard, and from a positivist perspective of science, only that which is measurable is considered, that is, that which is empirically observable, measurable, quantifiable, and measurable.

From a geographic perspective, the report presents data on innovation index indicators for all countries and economies included in previous years' reports and includes data on technological indicators. In the report, the Russian Federation and China had the best R&D results in the BRICS region. The two countries ranked 85th and 87th, respectively, behind South Africa (55th), Brazil (64th), and India (78th). Brazil moved from 64th to 61st, with scores of 31.6 to 47th and 54.7 in Institutions, Human Capital and Research, and Market Infrastructure, respectively. This contrasts with Brazil's innovation performance, which ranges from developing global innovations to the market implementation stage (capabilities that are difficult to build overnight). Continued investment in R&D infrastructure is essential and requires strong support from the authorities.

India has improved its market infrastructure, particularly in the protection of intellectual capital, and now rates intellectual capital protection at a similar or comparable level to that of developed economies.

South Africa, meanwhile, has been the main target of R&D activities carried out by multinationals, particularly in the automotive sector. Leading

South African universities have launched a number of spin-offs with expertise in gold, platinum, diamond, chromium, coal, manganese, vanadium, zirconium, nickel, and uranium mines. Persistent concerns about skills availability and labor productivity have motivated South African companies to invest more heavily in training and in innovation from within.

Determining the characterization and appreciation of the intangible or non-tangible level to be part of the structuring of an innovation index requires special refinement, considering that this level of appreciation coexists with sociocultural, institutional (governance), and macroeconomic structures that are projected at the micro level, such as inflation, the level of international reserves, and the exchange rate, among others.

The intangible or non-tangible level can be measured by measuring variables that express the interrelationships of causes and effects of economic and financial activity. In addition to the existing considerations regarding intellectual capital, these are made—referring to intangibles—according to neoliberalism; with certain acquired rights, which even have some basis in the past, currently of little relevance from the perspective of creating future well-being, whether material or symbolic.

The above is not intended to establish a dogma or a known milestone for the measurement of intangible variables, but rather to guide researchers on the professional need for the rational design of an indicator with sufficient internal coherence and a solid theoretical foundation. In this regard, guidance is provided by showing an example of an indicator, the innovation indicator known as the Multidimensional Innovation Indicator (MDI2). A database has been designed with 92 indicators of potential factors that can influence the innovation process, classified into six different groups according to the logical proximity of each factor: Science and Technology; Innovation Activities; Market Creation and Development; Growth and Business Cycles; Evolution and Structure of Firms; and Contextual Factors. The objective is to analyze the innovative capacity and active intensity of nine regional innovation systems.

After carefully analyzing the data from the Global Innovation Index, I have concluded that the information it provides is undoubtedly valuable.

4. Human Development Index

The Human Development Index (HDI) takes into account factors beyond income, such as life expectancy, education, and standard of living. By incorporating these dimensions, the HDI offers a more comprehensive view of human development and well-being, provides a more nuanced understanding of progress, and allows for a more accurate assessment of social well-being.

In the field of human development, welfare economics and economic growth have undoubtedly been governed to date by the concept of the Human Development Index. This index, in addition to being the central theme of a vast literature on developing countries, is used as an international reference to compare the relative situation of these countries compared to developed ones.

Conceived by economists, it was created as a composite indicator that addresses three dimensions of human development: life expectancy at birth, the nation's average educational level, and real per capita income, measured according to Purchasing Power Parity to balance the books in these three broad categories.

However, the index never managed to displace the preexisting interest of specialists in the Gross Domestic Product per capita as the sole and exclusive focus of attention. However, the creation of the index underscores both the interest and the need to quantify terms such as life expectancy, the population's educational level, and investment in public health and education, as well as assess their benefits to a society's quality of life.

The origin of human development analysis dates back to a study on the progress of nations commissioned by the World Bank from Yale University, published in 1972. This analysis highlighted the use of alternative indicators to the traditional per capita gross domestic product, which demonstrated the quantity and quality of life opportunities available to people.

Despite the importance of this study, it wasn't until 1979 that certain parameters were established to assess the size and distribution of these opportunities, with the launch of the first Human Development Report.

This report published a series of non-monetary indicators as alternatives to per capita gross domestic product, primarily of an educational and health

nature, adding income and leisure, and recommending the same geometric weighting.

Its authors recognize the disadvantages of using a ratio compared to other mathematical methods, but the critical content of their message seeks to raise awareness rather than theorize about human well-being.

The Human Development Index (HDI) is a synthesis aimed at measuring three fundamental dimensions of human development, which must support sustainable human development:

- the ability to lead a long and healthy life, assessed through life expectancy at birth;

- the ability to acquire knowledge, measured by estimating the average number of years of schooling of adults and the average number of years of schooling of younger generations, included in the educational program achievements;

- and the ability to achieve a decent standard of living, measured through the Purchasing Power Indicator, which equally assesses annual variations in GDP per capita to assess the progress of the model's various ratios.

As with all synthetic indices that attempt to capture complex and dynamic realities, the HDI and its variants suffer from conceptual and methodological shortcomings.

Regarding its conceptualization, some aspects that lend scientific rigor to the index clearly have room for improvement. Although elements such as the context of development, the enjoyment of its results, gender equality, and women's empowerment have been added, other aspects that value inherent qualities of human beings in their collective dimension are not adequately reflected.

Furthermore, environmental elements that, while not directly derived from the specific development model, actually affect components of this synthesis are not considered. Factors or indicators that do not yet impact one of the components of the HDI may be weakening another impacted component.

This index sought to go beyond the Gross Domestic Product, measuring people's capabilities through three variables: GDP as an economic measure, life expectancy, and education. These variables are integrated into a value ranging from 0 to 1, where 1 represents the greatest development. It measures each country's progress and allows for its global and regional classification. We will use the world ranking to evaluate this achievement; however, for the purposes of this analysis, it will be superimposed on a percentage basis.

The Human Development Index (HDI) was created in 1990 by the late Pakistani economist Mahbub Ul Haq, along with the first Administrator of the United Nations Development Programme (UNDP), Dr. Gustave Feiss.

It was designed as a response to the extreme simplicity of national development rankings based on gross national product (GNP) per capita, an index Haq derided as "a coffin for human beings."

Although initially proposed as nothing more than an annual comparison of human development progress in UNDP member countries, the HDI was adopted by international research, financial, and aid organizations before it could even be published.

The annual publications of Human Progress Indices by UNICEF, the World Bank, and the OECD, which use the HDI methodology, are direct testimony to its widespread acceptance (Nayak, 2013).

The rapid adoption of the HDI by least developed countries (LDCs) that were ranked as "more humane" by high-HDI countries, and the resulting global liberal internationalist discourse, is nothing short of remarkable.

The HDI spurred a discourse about what development is, a discussion that had been absent or superficial before the index's creation. In a 1995 speech, US President Bill Clinton stated that "in the end, what matters is the dignity and worth of the individual." He aptly summarized the power of the HDI and the international discourse it sparked: "A United Nations report… ranked countries not on the basis of their wealth or military strength, but on how they treated their citizens… That report sparked a debate around the world…" A flourishing civil society around the world, animated by curiosity about what exactly "human development" was, both criticized and adopted different aspects of the HDI and development as a whole. This increased citizen interest

is evident in the widespread collection of information about the ten indices that comprise the HDI through national media networks, even in some of the most impoverished developing countries.

In 1990, 81 countries had at least one national television network. By 2000, that number had doubled to 165 countries. Between 1980 and 2001, the number of radio stations per 1,000 inhabitants in sub-Saharan Africa alone increased from 5 to 50.

The Human Development Index (HDI) is a composite measure of human development. It was created, I repeat, as an alternative approach to development, considering it as a process of expanding human capabilities and options, rather than focusing solely on economic growth.

The intention behind creating a multidimensional index was to capture more than just economic wealth. In fact, it was intended to show that economic growth is not the same as human development. Although the HDI is a composite measure, it is relatively simple, as it includes only three basic components: life expectancy at birth, average and expected years of schooling, and gross national income (GNI) per capita adjusted for purchasing power parity (PPP).

The rationale for each of these components is that they are directly related to human well-being and development. Life expectancy represents the health dimension of development, while education and income are considered the two most important dimensions of human capabilities.

The HDI score is obtained from four steps involving a particular indicator of health, education, and income, and the following mathematical transformations: calculating the three component indices, aggregating the three component indices to obtain the HDI, and rounding the HDI.

In the Report, the health dimension of development was measured by life expectancy at birth, while schooling and income are proxies for the "means" of expanding options. The intention of the HDI is to provide a single number that reflects a broader understanding of human capabilities and quality of life, rather than a narrow focus on economic measures. However, it is questionable whether such a complex and multifaceted reality can be adequately captured by a single number.

The Human Development Index (HDI), since its inception, has been criticized for both its methodology and its philosophy. Nayak (2013) summarizes some of the main criticisms of the HDI, which include:

- the number, nature, and choice of dimension variables selected and their weights,
- the choice of objectives,
- the inadequacy of the idea of a composite index to capture the phenomena of interest,
- the lack of concern for distributive justice,
- the lack of theoretical justification for the formula, and
- the use of similar national averages for different levels of aggregation.

Regarding the choice of dimensions, significant criticism has been made. Although the HDI was created as a holistic measure of development, it chose only three dimensions of development, which inadequately capture human development in general (Mercado, 2013).

Therefore, the HDI is accused of oversimplifying complex realities. Furthermore, human development is a broader and more encompassing concept than the HDI framework. Although income, life expectancy, and literacy are important indicators of human development, these three, and the implicit considerations behind their selection, are far from exhaustive.

As Nobel laureate Amartya Sen has pointed out, the HDI's focus on only three dimensions of development reduces and impoverishes understanding of the diversity and richness of the human development experience.

The HDI, despite being a composite index of three fundamental aspects of development, inadequately captures the phenomena it purports to measure.

Other significant dimensions, along with the indices that influence human well-being, are ignored in the formulation of the HDI.

For example, political freedom, cultural freedom, ecological sustainability, security, employment, and gender equality play important roles in shaping human well-being, but are not adequately represented.

Due to its chosen dimensions, the HDI has been accused of epistemic imperialism—that is, it represents a particular conception of development that all countries are encouraged to emulate and according to which they are ranked.

Along with the previous point about the inadequacy of the chosen dimensions, a concern arises regarding equity. Modeling the same index with very different data leaves open the possibility of abuse.

Furthermore, as they point out, the HDI ranks countries based on data, some of which relate to elements that do not circulate freely, and when they do, they do so in very different contexts.

Although it is often argued that the HDI gives equal consideration to its concerns (dimensions and weights), in practice some considerations carry much greater weight than others.

For example, while the effects of the income index on the rankings are "attenuated by the use of a logarithmic score," the life expectancy index does not have an equivalent adjustment and therefore has a "disproportionately large impact on the rankings."

Finally, regarding ethics, the HDI has been criticized for its lack of stakeholder representativeness/inclusivity and for its artificially chosen paradigm. This has led to criticism that the HDI models development simply as "growth in" rather than "growth from" freedom.

Despite covering several social and health indicators, the Human Development Index (HDI) still fails to adequately account for the significant disparities that exist in countries' development outcomes. Unlike GDP, which broadly captures income inequality, the HDI does not take into account averages of development indicators across countries.

Because the HDI primarily measures averages, it overlooks disparities that exist within countries, which often have a more significant impact on development outcomes (Mercado, 2013).

While the HDI attempts to account for inequality through the Inequality-Adjusted Human Development Index (HDI), this measure is modeled within a very specific framework that relies largely on income disparities alone.

Instead, a more nuanced set of factors is required to account for the impact of socioeconomic disparity on human development. In particular, three factors are described:

- income inequality,

- poverty levels and unemployment rates, and

- the level of inequality in the distribution of employment.

Furthermore, gender inequality is an important dimension of human development. The level of gender inequality in a society often determines a woman's opportunities, relative to a man, to access resources and life opportunities relevant to human development, which determines the capabilities a woman can achieve. As such, gender inequality should affect the assessment of a society's human development (Mercado, 2013).

This raises two questions about the HDI. The first question concerns how adequately the HDI measures gender inequality. The second question concerns how much human development is underestimated or overestimated when there is an inadequate measure of gender inequality or it is omitted altogether.

The inadequacy of the HDI in measuring gender disparities in human development is explored. The critical implications of this inadequacy are discussed in order to raise awareness of the realities hidden by this traditional metric. The gender disparity in human development achievement is examined using specific indicators for each dimension (the HDI's education and income opportunities indicators) that more adequately capture gender inequality in the assessment of human development.

The paper addresses the task of understanding how gender roles are shaped by relevant sociocultural factors in different societies. It then attempts to understand how investment in gender equality is disadvantaged, consciously or unconsciously, in societies where men are granted preeminence in a wide range of resources and opportunities. The paper presents the implications and trade-offs involved in scenarios where gender equality initiatives are implemented or are only half-heartedly implemented.

Finally, the paper seeks to provide a foundation for further research on these important issues. Gender equality and human development are inextrica-

bly linked. In the quest for a broader understanding of human development, it is essential to pay attention to the necessary changes in development indices as they are currently conceived and applied, which are necessary to more effectively address gender issues.

Additionally, if we focus on environmental sustainability, perhaps the most vital aspect of development is the question of its integration into the HDI. A healthy environment fosters human development, and neglecting ecological dimensions could jeopardize future social progress.

What is the relationship between human development and the state of environmental health?

Development has been and continues to be a process that profoundly transforms social and ecological conditions. Policies that promote human development can often overlook the impacts such policies have on the ecological context and the services it provides to humanity.

"Development at any price" could worsen the state of essential ecological variables, such as the concentration of greenhouse gases in the atmosphere, the extent of the ozone layer, the state of the oceans, the length of major river systems, the level of biodiversity, and the extent of natural forests.

(Pineda, 2012) warns that human development as measured by the HDI could, in certain scenarios, follow the example of the ongoing disaster of deteriorating environmental conditions. By 2050, the trajectory of human development would reverse if there were no significant changes in environment-related policies (Pineda, 2012).

Furthermore, could progress in human development coexist with the impoverishment or collapse of crucial ecological systems?

Some authors argue that even progress on the HDI could mask a deterioration in the state of the underlying ecological systems on which human development depends.

The importance of ecological systems is central to the debate on the HDI and development. "Development policy frameworks, even in the poorest countries, should incorporate environmental indicators that reflect people's access to essential ecological services."

If the lessons of the past are ignored and current policies do not change to correct the neglect of ecological issues, the current waves of globalization, liberalization, industrialization, urbanization, and the expansion of technological solutions could irreversibly impoverish the ecological foundations of human well-being for future generations.

States, peoples, and civilizations are often presented as relatively closed units in time and space. To ensure the survival of humanity, development must be rethought as a creative, conscious, and collective balance between economic progress and the integrity of the ecological systems that sustain life.

The consequences of failing to consider environmental sustainability in the HDI are examined, and specific indicators that could be incorporated are described. As currently calculated, the HDI, like other development indices, prioritizes economic production over ecological health, which encourages the unsustainable overexploitation of the planet's resources (Pineda, 2012).

As available wealth increases, so do the pollutants and waste streams generated by that wealth, allowing developed countries to continue "cleaning up" the developing world, legitimizing practices that would be unacceptable in their own countries.

The problem is not a lack of global agreements and pacts, nor a lack of capacity to implement them. The problem is the compatibility of "development" with the "environment." Clearly, there is a need to develop a more holistic understanding of human progress that incorporates ecological imperatives alongside social and economic ones.

Simply redefining the boundaries of development to better encompass environmental concerns will be problematic, as there will be considerable resistance to such inclusions, especially from those who currently frame and measure development.

As a response to some of the shortcomings of the Human Development Index, the Gross National Happiness Index represents a growing alternative approach. The GNH Index is based on the premise that "development must be more than growth; it must result in the 'GNH' of the people… [and] genuine development… must seek to ensure that the individual is at the center of the development process." Thus, it emphasizes that the holistic well-being

of individuals must be prioritized over mere concerns about increasing economic growth levels. In 2008, Bhutan became the first country to introduce the concept of GNH into policy. Since then, many GNH initiatives have been taken, including the establishment of the Center for Bhutan Studies in 1999, which prepared the first GNH Index in 2008. This Index is based on nine sometimes complex, but well-articulated and highly significant components of social progress, which include:

- psychological well-being;
- health;
- education;
- time use;
- environmental diversity;
- good governance;
- community vitality;
- cultural diversity; and
- economic diversity.

While the HDI is an attempt to present economic growth from a more human perspective, the GNH Index is an attempt to go beyond that perspective and measurement and to argue that "progress should be measured in terms of what really matters to us as societies and as individuals – happiness, quality of life, and not merely in terms of economic indicators" (Gawlik & Gołębiowski, 2014).

In other words, it is argued that for social progress, economic growth is neither a necessary nor sufficient condition; therefore, it should not be the central concern of policy. Economic growth, productivity or efficiency, and associated material successes—level of wealth, availability of goods and services, etc.—are considered pre-established measures of progress in this GNH approach, a critique of the HDI approach. Further developing the GNH concept and index, it is argued that development discourse and policy should include subjective measures of happiness and quality of life in both consideration

and measurement. If this GNH approach is systematically applied, it will be necessary to reframe development and public policy toward sustainability and the inclusion of socio-community concerns. Therefore, the GNH concept and index can be considered an alternative and holistic framework for reconsidering and reconstructing policy priorities, types, and measures.

Finally, one of the central problems with the Human Development Index is its policy implications. A development score, a composite index, or a development ranking can determine national and international policies, priorities, and resource allocation (Mercado, 2013).

The concern is that overreliance on the HDI can lead to resources being allocated to countries just below a threshold (particularly those countries at or just below the low HDI threshold), creating a policy environment that exacerbates inequalities rather than addressing them.

It has become clear that focusing solely on the HDI can overlook areas of critical need, as it encourages policy attention to those aspects of development measured by the HDI.

The HDI has driven policies aimed at addressing inequalities in access to education and expanding national income. In some post-1990 countries with low HDI scores, national income growth has outpaced growth in education or health, resulting in a downward HDI ranking. In contrast, growth in education and health has outpaced national income growth in other countries, resulting in an upward HDI ranking. Therefore, policies based on the HDI can have various consequences.

The concern is more general: in guiding policy decisions, indices should be comprehensive rather than partial measures. In other words, development should be understood in all its dimensions, and indices that purport to measure development should reflect this. The HDI includes only one measure of each dimension, so by definition, development is limited to these dimensions. Furthermore, the HDI encompasses only three of the many possible dimensions of human well-being.

Finally, there is concern about the aggregation of achievements into a single index ranking countries. In the 1990s, composite indices emerged to reframe development issues. Development assessment and policy were framed

in terms of composite indices, particularly the HDI. The way development indices shape the policy framework is questioned, and the policy implications of poorly formulated indices are reexamined.

5. Happiness Index

Evaluating the quality of life and well-being worldwide has been the work of many research centers, governmental, and non-governmental organizations. The United Nations has undertaken a program of evaluation of human economic and social progress since 1960, with the aim of moving beyond the simple measurement of national income and achieving a broader and more authentic understanding of the progress of peoples.

In this regard, a report has been published every year since 2012 that uses happiness as the main axis of its measurements and proposals. The happiness of a country cannot escape its inhabitants, and since the measurement of happiness is connected to people's greatest concerns, it is a more accurate reflection of the general state of a people than any other indicator we might attempt to measure.

Happiness can be defined as a pleasant emotional state that arises from within, as a result of the presence (and also the expectation) of a series of "good" things in our lives. Highlighted in it are, among others, the following aspects: self-satisfaction, knowing that there is a positive relationship with others, knowing that one is loved, achieving certain short-term goals or (if not) feeling capable of doing so long-term, enjoying things, and feeling a high level of emotional, physical, or social well-being.

Happiness is the state of mind in which a person, fully—fully because it refers to all dimensions of the human being—reflects on them, activates them, and empowers them to get the most out of themselves, to be at their best, and ultimately, to promote self-realization.

Happiness is not the result of a series of material, physical, social, territorial, economic, or psychological goods. Happiness arises as a side effect of the harmony of life: inner harmony and outer harmony.

Happiness is not a "thing," it is not a "good" that unites another; it is a "simple" reality, not reinforced by another level of goods. Therefore, it is

not an "end" that is oriented toward other "ends." Happiness (like "virtue") is not connected to another material good, to another "adjacent" end; it is not a close relationship, a reciprocal relationship or completion. Happiness (like "virtue") is simple; that is, it tends toward itself, residing in the act, without being greatly reinforced by other adjacent goods.

The idea of researching the happiness index has had different interpretations and meanings throughout history and depending on its audience.

There is a clear scientific and social importance to continue advancing the study of happiness: scientifically, insofar as it is a necessary paradigm for continuing to accumulate knowledge; and socially, because it is part of the moral and ideological testimony of a way of understanding life.

The proposal to measure the happiness index may entail the search for a moral or ideological framework that many will find inspiring for the design of public policies.

Numerous studies have been conducted to advance our understanding of happiness. In the late 1990s, happiness was often overlooked in the field of applied psychology, when the term "stress index" was coined.

They decided to include a question that reflected the opposite of what the scale measures. The most relevant motivation indices for job performance were defined.

Regarding happiness, progress was primarily made in the field of clinical psychology, highlighting studies where happiness or subjective well-being—which many use as a synonym—appears simultaneously with personality.

It is interesting to highlight an initiative whose objective is to "provide information and documentation on the distribution of happiness across nations, cultures, time, and populations."

This work reveals how happiness (or subjective well-being) has evolved over time, surprisingly revealing that it has not increased despite the economic growth that has taken place in many societies.

Although happiness is generally difficult to calculate and can be attributed to a multitude of factors, more recent studies point to a compendium of different variables that have proven capable of explaining happiness in nations,

such as Gross Domestic Product, life expectancy at birth, the educational level of the population, perceptions of corruption, social organization, and interaction with the environment.

In his work Ethics, Aristotle analyzes the concept of eudaimonia, which is often translated as happiness. The author argues that happiness is the ultimate goal; we strive for it for its own sake and not for anything else. The term happiness comes from the Latin word, meaning "rich," and thus, according to Aristotle's definition, it is related to spiritual elevation and wisdom. According to Aristotle, eudaimonia is an active good, consisting of achieving the highest good, which is only possible through the use of the faculties inherent to us by nature.

The first major advances in the measurement of happiness in the 20th century occurred in the 1930s, with the development of self-assessment techniques such as personality tests and behavioral definitions of happiness linked to optimism, life satisfaction, or success in various areas of life.

World War II prompted the return of previously discovered knowledge, leading to the exploration of previously prohibited fields, with professionals and technicians with experience in research centers migrating to families and universities.

The return to normalcy and the fear of discovery led to a certain paralysis of seemingly expert parallel research in other fields, shifting research with people to fields such as industrial psychology, clinical psychology, psychology described as such, or clinical training relationships.

Economic growth, the survival of the social market economy, and well-being are not always concordant terms, since the same levels are not necessarily achieved on both variables. A zero Gini coefficient does not always guarantee investment in education or even improvements in the indicators described above.

To advance this path of public policy formulation, the happiness index was proposed and created with the express purpose of making it measurable, quantitative, and comparable with that of other regions of the country. Indexes in this regard have been available for years, and the Genuine Progress Index

was created. While it weighs three dimensions, not all of them are derived from or based on well-being or the items that comprise it.

The most commonly used data to measure subjective well-being are health, education, income, work, religiosity, marriage, social sustainability, and commitment to ideological and political values.

There are indices that have taken into account the subjective well-being of individuals. These are usually established as a set of positive psychological states, such as perceptual, cognitive, and behavioral aspects evaluated positively and that have at least some cognitive and evaluative components distinct from the affective ones.

A multidimensional concept of subjective well-being is agreed upon, in which growth and development, equity, social relations, participation, material security, health security, enjoyment of a clean environment, freedom, good governance, and ecologically sustainable economic performance play a fundamental role.

In the analysis and measurement of happiness indices, many selected variables are national in scope, so their disaggregation at the regional level requires a sufficient degree of regionalization.

Finally, one could include a measure of poverty or a measure of income redistribution and inequality, since the global well-being index estimates that approximately 79% of the variation in the "Cantril ladder" (a research tool used to measure life satisfaction and composed of 10 steps, with 10 being the best and 0 the worst possible life) is due to economic variables.

Another factor that appears in all studies on happiness is the emotional component. The emotional phenomenon is found at three levels: the individual level, the group level, and the organizational level. At the individual level, mood influences how we approach daily tasks and, consequently, has an effect on individual performance. In other words, an employee who approaches their daily tasks with a positive mood will achieve greater success, while conversely, an employee who approaches their activities with a negative mood will achieve lower performance.

This positive effect is due to the fact that, if we are in a positive mood, our attention is focused on ourselves. Since we are in a situation of security,

we have achieved the goal we set, and our effort will increase. Furthermore, we will pay more attention to ourselves, our self-esteem will rise, and finally, given this increase in our self-esteem, we will maintain the same emotional state.

On the contrary, if we are in a negative mood, our attention will be focused on the problem we have to solve, which will affect our performance.

Regarding individual performance, it also seems necessary to consider the different dimensions in which it can be measured: productivity, quality, creativity, and well-being, also as a critical construct, measured in terms of employee satisfaction or happiness.

On the other hand, it is relevant to emphasize the concept of leadership, described as a critical factor that influences individual well-being and morale and, in turn, determines the climate of an organization's units and services.

Additionally, cultural factors are related to the behavioral dimension. There are rather collectivist cultures such as Japan, Korea, China, Latin America, and Africa. In these, human behavior is closely linked to roles within the group. Individualistic cultures, on the other hand, are those that prioritize the dimension of the individual and its achievements, typical of cultures in North America, Australia, the United Kingdom, the Netherlands, etc.

This leads us to question: How are these two dimensions related in this context?

Individual values would generate greater life satisfaction in individualistic cultures, but also a larger gap between the achieved and desired goals, so the perception of happiness would be equivalent in collectivist cultures.

In the psychological field, it has been shown that individual well-being and collective well-being are not mutually exclusive; both contribute to a high level of happiness at the subjective level.

The literature relating the development of culture and its relationship with the aforementioned levels is well-known. However, it is postulated that designing policies for the development of society and improving indicators of happiness and quality of life require serious consideration of this aspect.

Examples of these policies include legislation that protects against discrimination based on sexual orientation, ethnicity, or beliefs. As these laws

protect more population groups, the greater the freedoms to develop in a healthy, equitable manner and to be free from social stigma, thus increasing levels of well-being.

The happiness index attempts to approximate this, as it measures, to a certain extent, the effectiveness of a policy in the medium and long term, and can support or discourage its adoption.

Given the characteristics of the happiness index and its relationship with various economic and social variables, it is possible to establish a series of applications and policies based on it:

- We must act with society in mind.

- Health is a personal or individual issue; we must incentivize good lifestyle habits and teach people how to live without the weak public spending it entails.

- Promoting cultural and leisure activities, as well as sports, also have a positive impact on our well-being.

- From an economic perspective, it has already been seen that living in extremely poor conditions does not produce well-being, but beyond a minimum level, increasing incomes, unfortunately, do not lead to corresponding increases in well-being.

- Workers must be seen as people who desire further education, who want to contribute part of their uniqueness to their workplace, that is, who seek a framework of well-being both from a material and physical perspective, as well as from an emotional and evaluative perspective.

The happiness index has generated much criticism as a methodology, from psychologists, but also from economists, politicians, and citizens themselves, with a general assessment.

Among the most frequently heard methodological criticisms is the paternalistic view of those who developed it, which considers values such as goodness, freedom, justice, and equity. These are subjective assessments that are projected into the index results.

The plurality of views that may exist about happiness has not been taken into account, which corresponds to the long-standing debate about how to measure happiness and dissatisfaction.

The study of happiness has become a relevant concern for different areas of society, and especially the economy. An interesting line of research is to determine at what level of consumption of material goods increases in satisfaction cease to be reported.

Likewise, the concept of addiction extends to other physical and psychological areas, such as food, shopping, alcohol, drugs, physical exercise, and sex, among others.

Such behavior provokes a reward and high doses of pleasure, reducing anxiety. It will be necessary to determine at what point pleasure becomes pathological and harmful to the individual and their environment.

Since happiness can depend on how one feels about others, it is interesting to delve deeper into the study of social and personal image, prestige, and reputation. We may find that, although the dictionary establishes certain considerations about happiness, wealth, and the possession of material goods, this is not in itself sufficient security to feel secure and comfortable with oneself.

Using the results obtained in studies of social marketing and persuasive communication, the guidelines determined by psychoanalytic theory, the behaviorist model, and the cognitive model of happiness, the subject can have a positive perception of themselves, objects, and their contexts, modify their responses, internalize social influences, etc., leading to a state of subjective happiness.

As with any theoretical approach based on a supposed measure of well-being with explicitly normative criteria, the question immediately arises as to why this criterion is chosen rather than another. Traditional approaches take money as a measure (if not direct, at least indirect) of well-being. More income means greater well-being, and therefore we can measure well-being through a numerical variable such as each person's income.

A person who has more goods can increase their consumption and therefore their happiness. Consider that human needs cannot be separated from the material resources needed to satisfy them. Thus, when a person suffers from

a lack of food, they feel hungry; hunger is a biological need, but without the food necessary to satisfy it, they don't eat. The sensation of hunger is appeased and the resulting discomfort ceases by adopting and smoking. Here we would be talking about the satisfaction of a need, but through the dissatisfaction of a different and very important one.

Initially, only one good was required, which was obviously not being satiated at the nutritional level, but rather being full at the organic level. The fundamental problem with these models is that they are making a hidden assumption about people's behavior.

They assume that people have a well-being function that depends exclusively on their income. However, people are not static, but dynamic beings in constant evolution. A person's level of consumption of material goods affects this process of personal growth, because they can hinder the exercise of their freedom and constitute sources of distraction unrelated to or contrary to their true desires.

The same applies to a community's purchasing power, which also determines social organization, dominant collective values, educational opportunities, and access to cultural services. The Chinese experience is a good example of how this assumption is flawed, as people tend to value what they possess based on what others possess. Since everyone desires to possess more than others, an arms race to earn more than others always ensues; some will succeed, but they will do so at the expense of the well-being and happiness of those unable to compete.

The limitations of the utilitarian model and the difficulties in measuring well-being have led to the search for new bases for assessing progress, proposing a measure of happiness and the subjective well-being of the population.

The search for indicators of quality of life or subjective well-being intensified in the 1960s and 1970s.

Various manifestations in this regard led to a profound rejection of economic development models that measure the level of well-being of a country or community through output or income. The relationship between income and well-being moved from the paradigm of economics to becoming a topic of analysis and a search for the reasons for tense and disconcerting realities.

The common denominator is overcoming a conceptual stumbling block of the human being: well-being.

GDP is a measure of the value of production, both in monetary terms expressed in dollars. To correctly measure well-being, it is essential to know how to accurately measure happiness. Three possible sources of information are described for measuring happiness:

- Behavior, which would include both choice-based behavior and behavior motivated by affect.

- Subjective experiences, and

- Contextual variables.

An attempt was also made to find an indicator of people's perception of the improvement or deterioration of their well-being.

Various approaches have been used to measure happiness. Some studies have used utility indicators, while others have relied on life dissatisfaction.

Indicators and variables are present in every subjective well-being prediction model. Indicators are synthetic measures of reality, of a phenomenon in question, based on which a variable is measured. On the other hand, a variable is a phenomenon, quality, or magnitude that can take on different values, such as intelligence or subjective well-being.

The quality with which we measure the happy life variable will be conditioned by the richness of its indicators, sub-indicators, and items. The indicators are satisfactory life, meaning, and well-being. The sub-indicators of satisfactory life are:

Health: Events that negatively affect you worry you and have decreased the intensity of your well-being.

Happiness and satisfaction: In general, you consider yourself a happy person.

Relationships and social stability: You get along well with your friends and coworkers, and you have a satisfactory relationship with your family.

Economic situation: Your standard of living is good compared to people your age. The meaning sub-indicators are: religion and values. The well-being sub-indicators are: personal development and education. Finally, the motivation indicator, determined by the need for self-determination.

Methods for calculating happiness include the must-have method, the must-have method, the assigned scale method, the average happiness level, the context or gradient method, and the social pendulum:

- The "must" method: The interviewee is required to rigorously assign a strict percentage, that is, they must distribute it among the three requirement variants. They cannot choose any of them, ruling out assigning a value different from 100 to the means. The advantage of this method is that it requires a considerable degree of reflection from the subject to avoid inconsistencies; furthermore, it guarantees the three requirements. However, it is difficult for the interviewee to comply with this requirement, as there are often distortions originating from a lack of knowledge of the three aspects.

- The "must" method: The interviewee is asked to figuratively determine the resources of time, money, and health needed to achieve the greatest happiness. The questionnaire does not include the psi requirement. The interviewee selects a point located on a scale of indefinite graphic dimensions, with the three axes. Advantages: the method asks the respondent to consider the "must" if the goods of fortune are sensible requirements in the totality of pleasurable affect; However, it falls far short of providing a plausible formula for obtaining the assigned value.

- The assigned scale method is an assessment technique based on a series of characteristics and a performance range for each. It is used to measure values, abilities, or competencies.

- The average happiness level method can vary depending on several factors, such as life satisfaction, mood, and social relationships.

- The context or gradient method is a gradient-based algorithm. It can significantly reduce the computational time required to converge to an optimal solution by limiting the search to promising directions.

- The social pendulum method. It can explain certain human behaviors

when they are very extreme. It also allows us to understand historical behaviors that have characterized societies at different sociopolitical moments.

The calculation for measuring happiness and assessing general well-being parameters is also based on different scores, such as the Oxford Happiness Scale, which combines scores based on life satisfaction, such as the level of satisfaction perceived individually. This scale is used in clinical evaluation to avoid the limitations of one-off or multiple-choice assessments based on automated information.

The main limitations of this calculation of the degree of satisfaction are based on the laziness of the participants, as well as the mental disorders involved. On the other hand, in its favor, it establishes successful reliability and validity, as well as adequate objectification of the criteria.

The actors responsible for the formulation and implementation of public policies, given the diversity in the composition and interpretation of subjective well-being, are the government, families, businesses, and civil society, as well as social groups, the main actors in its assessment. All these spheres of well-being, based on approaches that respond to a set of economic, political, cultural, and even family indicators, support and contribute to social well-being through individual satisfaction, and are premises that represent social development.

A first problem arising from the interaction between sociocultural variables and the perception of emotions has to do with the differences that exist in this latter aspect. It turns out that there are certain emotions that appear transversally in any known culture, and it is these emotions that are part of the classic models of emotions. However, there are other emotions whose cultural origin is more complex, since, to put it another way, they are common emotional expressions and do not, apparently, constitute "universal human emotions." Part of this is related to an evolutionary issue, in the sense that "universal human emotions" are those emotions that are sufficiently general and have a stable neurophysiological activation pattern over time, to have been able to operate as adaptive in different contexts.

Put another way, certain emotions must have been useful from the perspective of the survival of the individual and the group in different con-

texts, thus contributing to the survival of the human species. Furthermore, since human beings interact with other members of their species, and need to understand and predict their behavior in order to develop and maintain interpersonal relationships, emotional expressions are a fundamental source of information about the internal state of others.

Using objective measures of happiness, it is considered that the average quality of life has increased over the last century in most countries, and yet, most people do not consider themselves happier. This could be due to several factors.

On the one hand, material needs and desires have been largely satisfied, thus opening the way to emotional needs.

On the other hand, economic and material growth has led to utility, a negative impact on the environment, and inequality in the distribution of wealth, which means that we are not happier regardless of our level of material resources, since we find that there is always someone happier.

Therefore, they warn that the acquisition of resources and the problems they generate do not always compensate for the attainment of well-being.

Another aspect is that when individuals share a higher level of quality of life, they tend to adopt new needs and desires, which leads to an overall increase in their aspirations, and not necessarily in personal satisfaction.

This increase in subjective well-being reinforces the myth of unlimited economic growth, which can continuously saturate the individual, averaging their quality of life.

Consecuently, objective measurement, despite its advantages in terms of ease of collection and comparison, offers a partial and, therefore, incomplete view of reality.

Aware of the limitations of each type of measurement, some authors as early as the 1980s suggested that performance tests and objective indicators should be accompanied by other subjective measurements aimed at perceiving an individual's satisfaction.

In closing, I can affirm that one of the fundamental problems in the field of happiness measurement is the use of a single term to refer to different

educational phenomena, the most common being "happiness." However, throughout this study, I have sought to demonstrate the impossibility of measuring so-called happiness, due to the number of dimensions present in the educational phenomenon and the use of different data collection methods. I will also present a series of factors that hinder the measurement of happiness, proposed to lay the groundwork for future work:

There is no universal definition of happiness that allows us to establish a formula for measuring it. The same applies to education.

The term "happiness measurement" itself is a clear contradiction. If happiness is limited to a subjective evaluation of life in its entirety and past, it is impossible to use common measurement methods to quantitatively analyze this phenomenon.

In light of the above, the first course of action will necessarily be to conceive happiness from a temporal perspective, as a life trajectory and not as a mere snapshot.

Therefore, it is necessary to resort to complex, multivariate longitudinal studies that do not conform to methodological actions of successive model development, in which variables are eliminated based on their limited predictive capacity, but without addressing the full temporal dimension of the proposed relationships.

At the opposite end of the spectrum of the question about the actions that should be taken, the issue of the model's limitations becomes a central issue.

By removing the current quantitative models from the general framework and simplifying what is being proposed, some limitations would disappear, such as the number of items in the variables or the potential severity of the functional form of the relationships. However, relevant questions would also arise.

Thus, the generalization of the current variable scores to all individuals belonging to the created groups will depend on the sample size, which translates into the possibility of increasing the validity of the results with larger samples.

Within the framework of this research and without intending to modify the variables considered, which is not the objective for obtaining the cons-

truct, I will use the indicators already presented and accepted by the academic community during the period to be analyzed, such as INEGI, World Bank, OECD, among others.

6. Gini Index

Over the past two decades, income inequality has gained prominence in political and economic discourse. While the absolute level of poverty has declined globally, there is growing concern about the gap between rich and poor, both within and between countries. In 1912, Italian statistician Corrado Gini devised a simple index of unequal distribution. Because it strikes a balance between simplicity and sensitivity to income inequality, this measure remains widely used to measure income inequality across countries. However, this widely used measure has shortcomings that need to be highlighted, especially at a time when the debate about inequality is rampant (Sitthiyot & Holasut, 2020).

The Gini index is now widely available. Gini indices for all countries are available in the World Bank's World Development Indicators database, and many scientific journals publish updated Gini indices for countries with a large sample each year.

The Gini index is a coefficient used to calculate the unequal distribution of income among a country's population.

It measures the relationship between the concentration of income among two or more groups in a problem of income distribution among households in a population. If households receive equal shares of total income, concentration will not exist; if all income is received by a single household, concentration would be maximum.

The basic principle of the existence of social classes or strata based on income, work, and political influence has been the subject of constant attention by philosophers, economists, politicians, and writers, who eminently sought to justify their situation, demoralize it, or eagerly foment revolts in the social landscape.

Little by little, the postulates referring to the different indicators of inequality between the different classes and how they infer the relations of production and the dominance of one social class over the rest are being verified, revealing a direct proportional relationship that will mark the course of history.

These indicators have been, and are, a resource that allows for the economic objectification of certain aspects that are difficult to quantify directly and, therefore, difficult to interpret and open to subjectivity.

Inequality in income distribution is a phenomenon of interest to most countries, and its quantification and international comparison are undertaken using various methods.

Various indices have long been developed to compare income distribution among individuals or households within the same country, region, or group of countries. However, the key lies in analyzing and comparing the indices, examining which variables they correlate with and what the most relevant theoretical and empirical conclusions derived from them regarding income distribution have been.

In this sense, one of the most widely used measures for calculating inequality in income distribution is the Gini coefficient. This coefficient has two advantages. On the one hand, the Gini coefficient corresponds to an additive index of dispersion; it is less sensitive to changes in the income structure and always shows asymptotic evidence of the index's purpose, conditionally directional. Furthermore, the Gini measure generally requires only a few specific assumptions about how the income index is distributed among individuals. On the other hand, it will constitute a dynamic element in the formation of the threshold frontier rate if we are dealing with relative indices, or the growth rate necessary to generate a new robust inequality, if the indices are constructed as relative changes in the inequalities themselves (Sánchez et al., 2023).

The Gini coefficient is a measure of dispersion or inequality, obtained from the distribution of income or wealth, generating a number between 0 and 1 that shows the degree of concentration or inequality of said phenomenon. To describe how wealth is distributed in a country, for example, its population is ranked according to its income or asset levels, and the line showing the cumulative percentage of wealth relative to its share of income is graphed (the greater the equal share, the lower the concentration). If the line is straight, the country is in a situation of perfect equality; the opposite occurs in the case of a line with a 45-degree slope. This line has an important representative character, since the area between it and the triangle marked by the intersection points

and the highest point of the graph represents the Gini coefficient (Restrepo Sierra et al., 2024).

Since the perfect equity line reaches the vertex of the triangle, and the real equity line lies below it, the area of inequality represented by the Gini index is measured by the sum of the areas revealed below the perfect equity curve and above the real equity curve. Therefore, the lower the index measured, the greater the equality, as the value of zero would imply equal wealth sharing among all citizens. On the other hand, the value of one is the maximum possible value in which a single person has all the distributed wealth or income; one country has everything, and the rest have nothing (Avalos Alvarado, 2023)

In this regard, I want to emphasize that, for the purposes of this research, and in order to standardize the comparison of results when constructing the index in question, these values will be estimated as percentages, so they will overlap between 0 and 100.

Estimating a Gini index provides a synthetic measure of inequality. Inequality is understood to be a different situation if it is expressed in terms of income, production, etc. Depending on the type of distribution, inequalities can be classified into two types:

- Absolute, which occurs when the concentration of income used is far from any situation of equality.

- Relative, which means inequality occurs when it exceeds a certain threshold; the threshold may be the one actually observed in another economy, or desirable, if it is understood that excessive concentration and the lack of remuneration contributed by the lower links in the income-generating process would not exist; this distribution will not exceed said threshold.

The Gini index, or Gini coefficient, is a metric that measures income inequality, with values ranging from 0 to 1. Zero denotes complete equality, while one indicates complete inequality. It was devised by the Italian statistician Corrado Gini in 1912. Empirically, it can be calculated using the Lorenz curve or using a mathematical representation such as (Sitthiyot & Holasut, 2020):

[G = \frac{1}{2 \mu n^2} \sum_{i=1}^{n} \sum_{j=1}^{n} | y_i–y_j | \]

Where:

(y) = individual income,

(i\)º = individual,

(n\) = population size,

(\mu\) = average income, and

(G\) = Gini coefficient

If the population is ranked from poorest to richest, the Gini coefficient answers: what share of income does the lowest p proportion of the population have? More formally, it can be expressed as:

[G = \int_0^1 L(p) dp \]

Where:

L(p)\) is the Lorenz curve, representing the proportion of the population earning a proportion p of total income.

The Gini coefficient can be calculated in a variety of ways, including pairwise comparisons, observations on the Lorenz curve, or an income share distribution function. While these comparisons would produce the same Gini coefficient, it affects interpretations.

The Gini coefficient indicates how much the Lorenz curve deviates from the line of equality and therefore provides a snapshot of inequality at a given point in time. However, it simplifies complex socioeconomics into a single number, which inevitably results in loss of information and can be misleading.

Multiple criticisms of the Gini coefficient as a measure of income inequality from mathematical, ethical, and social perspectives question its effectiveness in capturing income distribution.

A crucial mathematical concern is its sensitivity to distributional changes. For example, in a hypothetical scenario, two people, A and B, earn 100 and 0, respectively. Under such a distribution, the Gini index equals 1. If A earns 60 and B 40, the index is 0.6. However, if A earns 59 and C 1, the Gini index remains equal to 0.6, leading to the erroneous conclusion that inequality does not change, even if the well-being of B and C worsens (Clementi et al., 2019).

Another mathematical criticism emphasizes that the Gini index is incomplete; it fails to consider extreme values in the income distribution. In two hypothetical distributions, the income of the first is 1 and that of the second is between 0 and 1; the Gini index equals 0 in both cases, since the classification is based on median values. In addition to completeness, the Gini index assumes independence; The Gini coefficient for pooled distributions is equal to that for individual distributions if they share the same mean income. This assumption may not hold in real-life contexts (Clementi et al., 2019).

From an ethical and social perspective, Thomas Piketty criticizes the Gini index for considering welfare transfers close to the modal value of income distribution as more important than those at the extremes. In economic terms, this refers to the weights or parameters of the social welfare function.

Piketty argues that social welfare is only concave to income distribution when it considers only relative distributions, such that factors such as wages and the profitability of capital determine inequality (Sitthiyot & Holasut, 2020).

Agreeing with this critique, the rebuttal insists that the Gini index establishes no functional link between inequality and social welfare.

Pierre Bourdieu argues that the Gini index does not reflect heterogeneity or asymmetry in income and wealth distribution. There is a class of concentration indices applicable beyond the mere measurement of inequality; the Gini index is one of many that measure concentration. Gini proposed his index as an appropriate measure of concentration useful for measuring inequality.

A popular interpretation of the Gini coefficient assesses the degree of inequality: the more concentrated the distribution, the more unequal it is. This contradicts the logic of Gini.

Many consider inequality to be a matter of income or wealth distribution, where the rich accumulate wealth and the poor become even poorer, or even trapped in a Malthusian world, as investments in education become returns to wealth.

The Gini coefficient measures the ability of income distribution to generate a questionable population income (wealth) structure. According to the Gini coefficient, income distributions are independent. Ignoring this

dependence shows an oversimplification of economic reality. Therefore, it constitutes an inadequate approach to analyzing inequality.

If the Gini coefficient is used to measure inequality, one must be careful about aggregating, grouping, or disaggregating populations.

Conversely, simplicity can lead to misinterpretations of economic inequality.

There are alternative measures, often more complex and demanding, that can facilitate understanding of the complexity of this world. The distributions of economic magnitudes are a complex concatenation of heterogeneity, skewness, and concentration that cannot be fully captured by a single measure. The performance of the still-popular Gini index arises as a consequence of the need to reevaluate the underlying assumptions of other commonly used measures.

The findings of this research have important implications for both policymakers and researchers. When recommending policy responses to address inequality, it is necessary to be cautious regarding the specific measure of inequality under consideration. While some policy decisions may exacerbate inequality according to one measure, they may reduce it according to an alternative measure. The results also highlight the importance of carefully considering the metrics used to assess inequality when reviewing the existing literature (Clementi et al., 2019).

While the Gini index is the most widely used measure of income inequality, many other measures have been proposed. Some of these alternative indices are theoretically superior to the Gini index. However, future research should not only seek to discover potentially more appropriate inequality measures but could also help redesign inequality measures within innovative methodologies and frameworks.

Ultimately, in the present construct, these considerations serve as a call to action for researchers and policymakers to adopt a more holistic view of income inequality.

While the Gini index and other measures have their uses, caution must be exercised regarding their limitations. Continued critical research on the robustness of widely used measures, as well as the ongoing development of alternative frameworks and methodologies, is crucial.

7. Demographic Aging Index

Demographic aging and its impact on economic development are currently receiving significant international attention. The United Nations reports that by 2050, the older adult population (aged 60 or older) will double, and nearly 80% of the world will live in emerging economies. Therefore, demographic change will have long-term impacts on the global socioeconomic landscape.

Population aging poses new challenges for many sectors, including healthcare, insurance, urban housing, and foreign trade. Many countries will face labor shortages and an economic slowdown. Meanwhile, aging increases the proportion of diseases, typically chronic non-communicable diseases, diverting medical resources from public health issues and healthcare services (Kim & Dougherty, 2020).

Often, the financial burden of health insurance will become heavier. In the current literature on aging, attention is increasingly focused on how aging affects productivity and socioeconomic infrastructure.

Productivity will gradually decline with age due to physical and mental fatigue, greater vulnerability to illness and disability, and reduced income. Older workers are less likely to acquire new technologies and skills, creating a gap with the younger cohort.

Social infrastructure is under pressure due to increased demand from the increasing elderly population, leading to higher public spending.

Research questions include: Does an aging population inhibit economic growth, worsen wealth distribution, and increase inflation and unemployment? Can aging promote educational levels and technological innovation?

Demographic trends have a significant impact on the development of an economy. They influence not only the quantity but also the quality of the labor supply, as well as social welfare and healthcare systems.

By the middle of this century, most countries are expected to have an aging population. As a result, a priority concern for policymakers is to understand the potential implications for economic structures and policies.

Similarly, the relationship between demographic changes and economic growth is a central issue in economic development.

Recent research focuses heavily on this topic due to the urgent need to provide an overview of global population aging and consider practical suggestions and implications for governments (Kim & Dougherty, 2020).

The term demographic aging is frequently used to describe a wide range of deep-rooted demographic changes that involve aging. At the most basic level, aging can be defined as an increase in the average age of a population.

A more precise definition of aging includes, among other things, a high old-age dependency ratio, longer life expectancy, and declining birth rates. The materialization of these points over time results in a rapid and lasting growth in the proportion of elderly people (Kluge et al., 2014).

Unlike other types of demographic trends, the entire set of changes that occur in aging populations are often interdependent and involve truly demographic processes.

Perhaps the simplest and most common way to measure aging is the old-age dependency ratio. However, any single value lacks a frame of reference in which to place that metric, and there can be many different notions of what might be considered a high or low value.

Since the implications of certain levels of old-age dependency ratios can differ depending on the economy and population in question, it is perhaps in some ways more illuminating to look at exactly the underlying components of old-age dependency ratios in terms of how old the individuals who make up that dependency actually are.

Furthermore, measuring the degree of aging in a population is inherently an oversimplification and only reflects a single aspect of the many changes that occur in a population as it ages over time.

To paint a more complete picture of how aging affects people and how two populations age in different directions, it is necessary to go beyond old-age dependency ratios and look at the many components involved in the aging process.

The proportion of people in older ages represents only one possible gender and can generate several alternative indices that attempt to capture aging more effectively.

As noted by Kluge et al. (2014), demographic aging refers to the increase in the average age of a population, primarily due to declining fertility rates and increased life expectancy. The aging trend of a population can be illustrated with a variety of demographic indices. The basic demographic index for indicating the aging of a population is the population's median age. When the median age is high, the ages of the entire population are skewed toward the elderly. In populations with higher median ages, dependency ratios rise sharply due to the rising old-age dependency ratio. Dependency ratios, which refer to the ratio of dependent populations (under 15 or over 64 years of age) to the working population (aged 15 to 64), are generally used to show the life-cycle burdens of each working person.

It is important to clearly distinguish demographic aging from other demographic changes. This distinction must begin with the multiple processes of aging.

There is "pure demographic aging," as defined above. Along with this orthodox multilateral aging, there are many other aging processes observed within societies. For example, in societies advancing policy and social development, the individual aging process can slow down and prolong itself. However, societies vary in their ability to provide an environment suitable for accommodating longer natural lifespans. Furthermore, it is essential to consider the global and international dimensions of demographic aging. Consequently, older and younger nations are affected differently by a multi-aged population. The demographic trends observed within individual countries can be classified into "aging countries" and "younger countries" (Faruqee &Mühleisen, 2003).

Understanding the phenomenon of demographic aging is an initial barrier to pursuing a broader and deeper analysis of society's social structure and economic policy. The ultimate goal of this definition and description of demographic aging is to suggest greater opportunities and numerous necessary tasks in these areas. Population aging has multiple facets with direct and indirect impacts on economic activity. It has been argued that studying historical population trends can provide some insights into the present and what can be expected in the future (Kluge et al., 2014).

In this latest wave of aging, some have already experienced its challenges. The age of the European population began to increase with the onset

of the Industrial Revolution through a sudden reduction in mortality. The proportion of the population over 65 years of age doubled most rapidly in the 18th century in Europe.

Understanding the demographic behavior of the population over time is key to understanding how societies have coped with and adapted to previous waves of aging.

Consequently, it is essential that the examination of aging be placed in a historical context.

Particular attention is paid to the historical approach to the study of demographic aging by analyzing some milestones in long-term population trends and providing an overview of the diversity of aging rates at the subnational level, highlighting the societal implications and calling for a more proactive approach to future scenarios.

Prehistoric substantive theory sets the paleodemographic stage and investigates the extent to which population and population-related aspects, such as food production, trade, and warfare, have predetermined the environment in which demographic developments occurred.

At any given time, and most notably in Western Europe, the major demographic milestones can be summarized as follows.

After the fall of the Roman Empire, there was a period of notably low demographic levels and stagnant trends in population demography. In strictly demographic terms, the Middle Ages was a period of notably slow and nonlinear population growth. The age of the European population began to increase with the beginning of the Industrial Revolution.

In this context, considering that a country's population should be treated as a historical specialty, tracing the history of population aging has advanced rapidly as advances in medicine and public health have increased average life expectancy.

This research can not only raise awareness about the aging of countries but can also provide useful case studies for designing responses to future economic changes that consequently affect growth and development indicators by, among other things, decreasing productivity.

It must be remembered that one of the objectives of economic development is not only growth, but also a system in which growth contributes to human well-being.

Currently, the distribution of the economic benefits of economic growth is prioritized among a limited range of activities, incomes, and individuals. This does not always contribute to creating a society that is sustainable in the face of external changes.

Introduced decades ago, demographic transition theory is widely known and has expanded its role in the analysis of population dynamics and their socioeconomic consequences. The unique feature of this theory is that it succinctly models the transitions from a population with high birth and death rates to low rates. Specifically, the theory postulates that before the transition, birth rates are high but fluctuate due to childcare and childrearing practices, and that declines in mortality precede declines in fertility (Navaneetham, 2002).

As a result, countries experience a transformation in their population structures, from a balanced pyramid in the pre-transition phase, to an inverted pyramid with a reduced proportion of young people during the transition, and finally to an ape-like pyramid burdened by demographic aging. These changes can have notable influences on the socioeconomic attributes of the population and carry implications for the pace and manner in which each society progresses.

During the pre-transition phase, with little access to nutrition and health care services, mortality rates will fluctuate constantly, offsetting high birth rates and creating a sustainable population structure of similar populations across all age groups.

As society experiences capital-intensive industrial revolutions and agriculture, medical and health advances alleviate mortality rates, predominantly infant mortality, causing high population increases and transformations in occupational attributes.

This will lead to the first transition phase, in which healthcare facilities improve and fertility rates decline as populations shift to an industrial economy, thereby increasing life expectancy.

During the transition, changes in production patterns and employment patterns occur. The proportion of young people uniformly declines, and the demand for specialized services, finance, and administration intensifies, improving their conditions. As a result, urbanization is promoted and markets flourish, increasing economic efficiency along with GDP.

The decline in fertility accelerates due to changes in child-rearing methods, capital, and insurance coverage, and educated society shifts wage investments toward safer options, increasing bank deposits and capital stocks. However, the existing disparities in the pace and timing of this transition warrant concern as they influence the heterogeneity of aging dynamics across regions, highlighting the importance of understanding these transitions for the careful interpretation of policies and updated population projections.

Demographic transition theory provides a simple theoretical framework that describes the transition from high birth and death rates to lower rates as a country develops.

The so-called demographic transition consists of the sequential four-stage (or five-stage, according to some authors) change in the demographic structure with a country's economic development. Birth and death rates, which are assumed to be exogenous, change between two values that depend on the stage of the demographic transition.

Because the industrial revolution or urbanization involves the development of the industrial sector, the need for labor in agriculture is reduced. Therefore, there will be an outward shift in the demand for labor in agriculture. However, traditional labor market models assume that the supply of labor is perfectly elastic, and therefore structural change has no effect on economic performance. However, due to rigidities in labor markets (due, for example, to search costs, firm recruitment costs, training, job socialization, employee risk costs of changing jobs), labor reallocation takes time; as a result, unemployment may rise or the growth rate may decline (Navaneetham, 2002).

Since structural change involves the movement of labor toward high-productivity sectors, labor market rigidities will impede the growth-enhancing effects of the demographic transition.

With the agricultural revolution, women may have fewer children, resulting in a reduction in the fertility rate. With less isolated women, the female participation rate may increase. Changes in female participation are important for demographics. Female participation has a non-monotonic relationship with development, first passing through a decreasing and then an increasing turning point. Therefore, a compound interest effect is created with the female labor force participation rate, which magnifies demographic pressure (Shin, 2013).

Ultimately, this result creates an "aging" population, and the labor force declines. But these changes in population structure also change the burden on the pension system, which bears an increasing share of fiscal expenditures.

Demographic developments are increasing the proportion of retirees in the population, and this fraction is becoming a significant part of the population. There is increasing pressure to maintain a good pension system, but the decline in the working population, and especially in the labor force, which provides fiscal resources, makes it difficult to provide such a system.

Furthermore, increased pensions lead to fewer children and slower economic growth, which further strains the pension system and induces its decline.

The pension system is therefore subject to a complicated feedback mechanism, which, under the current framework, leads to deflation in the growth rate. A decrease in the source of pension income will have an ambiguous effect on savings behavior. On the one hand, as the simulation results show, corporate savings could grow substantially. On the other hand, as the aging process affects the majority of the population, the increase in private savings is likely to be offset by a decrease in public savings.

In the Economic Implications section, the effects of age, time, and cohort on interindividual and intraindividual change in social attitudes are analyzed. Specific aspects of demographic aging are considered, such as the declining number of potential innovators driving technological progress, a shrinking workforce, and declining consumption at both the micro and macro levels, as well as ambiguities in the correlation between longer life expectancy

and economic growth. The extent to which demographic dynamics amplify pressures for social and political change is also analyzed.

It is important that comparative analogies take into account that most studies on the ecosocioepidemiological transition, the second demographic transition, or aspects of globalization begin from the perspective of developed nations. However, changes in the age composition or size of a population have a multitude of economic, social, and political implications. Broadly speaking, four problem areas emerge.

First, depending on existing conditions, these changes deepen inequalities or call into question macroeconomic adequacy.

Second, transformations in the composition of a population can trigger unintended, second-order demographic responses that possibly counteract the desired processes.

Third, in relation to some basic notions of temporality, particularly the limits of predictability and control—of whatever nature—rapid changes in the structure of a population entail adverse consequences.

Fourth, those sectors of society that are more rigid, whether culturally, organizationally, or institutionally, are likely to be at risk.

Between 1960 and 1980, political scientists and sociologists had discerned various age, time, and cohort effects. Age effects describe the impact on individual behavior of changes in a person's age, regardless of their date of birth (to the extent that an age difference is due to duration of exposure) (Kluge et al., 2014).

Demographic aging affects various aspects of society: for example, public support, health, and labor markets. The key concern is how to maintain the potential demographic dividend in the context of an increasingly aging population, improve labor productivity, and efficiently provide critical public support.

Aging influences the workforce in two ways: by decreasing the absolute number of potential employees and by altering its composition. An expected increasing number of very old people results in prolonged incomplete working careers, with a subsequent decrease in workers in the labor market. An aging

population also leads to an increase in labor compensation due to lower job preparation.

On the other hand, an improvement in the skills of the average elderly population has the opposite effect. Older people in good health tend to contribute to labor productivity long after retirement, in paid and unpaid terms, by participating in professional work or vocational activities. Since the rate of return to working time is higher in professional work than in vocational activities, the former should be addressed by labor force policies.

After excluding compulsive activities, people aged 65–74 still spend some time working in both regimes. The average elderly population is expected to be healthier in the future, mitigating health-related labor productivity problems.

Consequently, policy interventions that improve the health and skills of older adults, and support their integration into the labor market, are needed to reap the full potential demographic dividends.

The latter is crucial for promoting sustainable socioeconomic development, which will ultimately generate further benefits.

In line with several economic theories, very old people who have left the labor force continue to contribute to labor productivity through support for public health. Given the externalities associated with labor productivity, very old people continue to work. Mainly due to income inequality or market discrimination among the very old, these marginal older workers tend to be excluded from the labor market due to heterogeneous compulsory activities.

Demographic aging is a topic that few discuss. On the one hand, many economies are facing an aging population. Moreover, because labor markets function imperfectly, the economic consequences of demographic aging are less evident than is often assumed. Therefore, it is pertinent to highlight the main contributions and conclusions: a brief overview of the effects of demographic aging on the labor market.

The implications of demographic aging for economic activity are the subject of an extensive and growing literature. The effects on fiscal sustainability have probably been the most studied. While many base the macroeconomic implications of demographic aging on the simple argument that fewer workers

support more retirees, several aspects of how demographic aging proliferates in an economy can be included in the picture. However, compared to fiscal and social policy, the consequences for the labor market are less frequently considered. The labor market is where decisions are made about whether to work, formal employment, or permanent or limited-term contracts.

These decisions shape a set of material, good, but also non-material aspects of life in different countries. Consequently, changes in working conditions can also have a strong psychological limit. In current times, when traditional labor communities, such as unions, are gradually disintegrating, these effects may be well hidden.

Furthermore, more flexible employment relationships have recently become common, as technological advances allow work to be organized across borders, outside of business premises, etc. New employment relationships may be accompanied by new employment structures. For example, there are new hiring models for partners with non-standard contracts, which provide full trust and security like a standard office job. This provides protection against the effects of aging, while new legislation provides flexible working hours and remote operations for regular employees. Of course, working and order conditions also evolve due to trivial reasons such as the advancement and adoption of technology. Depending on a person's profession, the perception of those receiving an order may also change.

The combination of these effects means that the current view obtained from official statistics may not be sound, or even correct.

On the one hand, it is often thought that the decline in the working-age population creates skills shortages in the sectors analyzed. On the other hand, the mere perception of a lack of demand can also exacerbate the current reality.

Moreover, even when younger generations are considered more productive and capital-intensive, economic competitiveness may decline, especially compared to developing nations.

Finally, if older people need to work in similar environments, of which digital communications are a risk factor, a favorable work environment may require adjustments that entail economic disadvantages.

There is a consensus that the combined effect of social security provisions and cognitive decline, often accompanied by other diseases, is a lethal mix for fiscal sustainability, as both push a country's economy into a vicious cycle (Börsch-Supan, 2007).

Besides, demographic aging will have far-reaching consequences for social welfare systems, which are very important for the overall development of successful economies and societies (Phillipson, 2015).

Traditional social welfare systems serve as a safety net, protecting households against income and consumption shortfalls due to an adverse income shock.

These systems have a government component that can be financed through lump-sum taxes or distortionary taxes. Most governments allocate between 10 and 30% of their resources to social spending in the richest countries and between 5 and 15% in the poorest countries. This spending can take many forms, such as social insurance, unemployment benefits, or government provision of public goods (Börsch-Supan et al., 2007).

Regarding the sustainability of social welfare systems, existing systems, mostly conceived in the last decades of the 19th century, are not easily transferable. This is particularly true in countries where the labor market is very dynamic, civil order is deficient, and institutions are weak or nonexistent.

In many parts of the world, traditional social welfare systems intended to protect the poor or vulnerable have been bypassed, marginalized, or destroyed. The inability of existing social welfare systems to adapt to changing demographics and work environments is likely to be a growing problem in light of demographic changes.

By 2050, one in five people is projected to be over 60 years old. Globally, the average percentage of people aged 65 and over is expected to reach 21% in 2050, up from 7% in 2000. This indicates that a larger fraction of society will need support from traditional social welfare structures, for example, pensions and assistance.

Analyzing both the current performance of these structures and the impact of necessary changes is crucial. Importantly, the magnitude of the potential

adverse impact they face when they fail in their supportive functions relative to other aspects of the economy links them closely to the issue of productivity.

The Great Recession of 2008 and the crisis of 2019 highlighted the critical interdependence between social welfare systems and the productivity of other sectors of an economy. Output contractions reduce government revenues, and regressive taxation can worsen the government's fiscal position.

At the same time, falling GDP decreases overall demand and private savings capacity, which has a detrimental impact on private pensions.

International markets provide short-term emergency financing, but can worsen an affected country's debt sustainability. Unemployment increases, which decreases insurance coverage and overall resources for healthcare.

Both preventive investment and consumption are reduced by families fearing for their safety. On the other hand, large bailouts have a long-term cost on productivity, as resources are diverted from more efficient sectors.

Demographic aging has gradually been recognized as a key factor shaping many aspects of social and economic development. Countries such as Japan, South Korea, and those in the European Union are exhibiting distinct demographic transitions (such as low fertility levels, low mortality rates, or both) that pose a significant challenge for policymakers.

Recent research has focused primarily on quantifying the macroeconomic effects of demographic aging and the expansion of social spending on various social welfare programs. However, the role of social welfare systems as a key channel through which demographic aging influences economic performance and well-being has not yet been satisfactorily explored. Furthermore, only limited attention has been paid to the determinants of the wide variation in demographic pressure and the effectiveness of policy reforms that can delay the deterioration of economic performance and well-being.

Many industrialized countries have faced significant challenges in ensuring the financial sustainability of their pension systems. As the proportion of retirees who live longer increases, it becomes increasingly costly to provide them with a pension at a given level of contributions. The pay-as-you-go pension systems currently designed in most countries directly link retiree benefits to the number of contributors and their income levels. The

increase in the elderly population results in a lower benefit-to-contribution ratio, which puts considerable pressure on the fiscal budget. Therefore, many countries have adopted various adaptive reforms in their social welfare systems in recognition of this pressure.

These reforms generally slow benefit growth or force taxpayers to pay higher premiums, or both, to reduce the expected costs of population aging. Given that the "social contract" between governments and citizens will be strained or collapse with demographic change, it becomes even more important to reconsider social welfare policies to provide universal and inclusive protection for people. Research has shown that the effects of aging on almost all social welfare programs are much stronger than on GDP (Phillipson, 2015).

Overall, demographic aging has significant effects on the robustness of social welfare systems, which can be modified through coordinated policy adjustments.

The demographic aging of society poses a major challenge, but public administrations and industries can also benefit from the resulting opportunities.

It is primarily thanks to technological innovation that it is possible to successfully counteract the risks associated with economic changes resulting from an aging population.

Aging societies generate additional demand for "age-friendly technology" products and services. At the same time, new technologies offer the potential to activate or assist older adults, thereby significantly reducing the economic costs caused by demographic aging.

This technological assistance takes many forms, such as medical technology, age-appropriate equipment, security systems, or AI-controlled smart appliances. The digital skills and technological awareness of older adults are increasing. Aging societies primarily stimulate the deployment of new technologies. Hand in hand with the diffusion of technology, the proportion of older adults with IT skills and technological literacy is growing. Indeed, today's older citizens are certainly better equipped to cope with digitalization than their older counterparts.

While some researchers find evidence of greater adaptation difficulties in older adults, there do not appear to be technological barriers that prevent widespread use by older users at the same level as other age groups.

As population aging places unprecedented demands on healthcare, communities, and economies, increasing attention is being paid to harnessing technological progress to address these challenges (Pronk et al., 2021).

Demographic aging has become a global issue, in both advanced and emerging economies. Depending on the region, since 2018, aging has progressed at different rates and has had varying impacts on the economic structure. In the subsequent course of demographic aging, the effects have become increasingly significant, so there is now a focus at the national policy level on supporting economic development.

There are already several specific initiatives and successful examples of new technologies and products. The European Innovation Partnership on Active and Healthy Aging, launched in 2012, is a major initiative promoting innovation and aiming to improve the quality of life of older people in Europe. One of the main challenges in overcoming demographic aging is seen in the new technological field.

In particular, this collaborative approach to innovation was expected to enable breakthroughs in technological progress that would facilitate aging.

In line with a more explicit commitment to fostering research and development of technologies adapted to older people, a specific call for proposals was launched in the health and aging sector as part of the Eco-Innovation Programme.

This could take the form of a broader selection and promotion of good practices in eco-innovative technologies that respond to the aging population and are targeted at this age group.

Population aging is a global phenomenon, but the pace and nature of this process and societies' ability to address the associated challenges are not uniform.

Some countries face acute demographic problems because they have highly concentrated aging populations. However, even countries in other parts

of the world with younger demographic prospects are, and will continue to do so in the future, grappling with frequent and severe demographic changes, from very high natural increases to rapid population aging (Martínez-Maldonado et al., 2016).

In this context, it is important to take a broad view of the phenomenon, analyze comparative data on aging and responses to aging, and consider the implications of global changes for local cultures and populations. Taken together, global demographic trends show that, for the first time, life expectancy is 68 years worldwide. The World Health Organization (WHO) warns countries to prepare for global challenges such as aging populations, mobility of people and diseases, and climate change (Phillipson, 2015).

Analyzing different perspectives on the same global challenges will be the focus of understanding what globalization, with its intensification and expansion of its reach, implies for responses to global aging.

In conclusion:

- As life expectancy increases, job persistence over a longer period of the life cycle leads to a continuous adaptation of skills to changing labor market conditions.

- Continuous skills adaptation in the face of demographic aging is also an important condition for the economic integration of the aging population.

- Among a range of educational provisions, lifelong learning, both formal and non-formal, is considered the main instrument for maintaining employability in the constantly changing world of work.

- Despite the various obstacles and barriers to effective participation, there is broad consensus among policymakers and researchers that it is crucial to improve opportunities for people of all ages to access education and training.

- New forms of collaboration between educational institutions and businesses should be encouraged and developed to make training content more effective.

- Collaboration between businesses and education aimed at developing curricula should not be limited to young people but should also address the needs of the older workforce.

All of this constitutes a necessary condition for active inclusion, social participation, and the contribution of the population, which is crucial for developing labor-market-oriented training programs for older adults. These programs include "soft skills," specific vocational skills, and life skills that enable them to compete in the labor market.

In the medium and long term, it is advisable to keep this indicator in mind when constructing the EDI, since it has a direct influence on the productive potential of any country.

8. Environmental Footprint Index

The Environmental Footprint (EF) compares a magnitude derived from human activities with the Earth's biocapacity, which is a relationship between the various human activities projected annually on ecosystems, particularly water, fertile soil area, and emissions, and the natural rate of biocapital input; that is, the productive area of the biosphere and the natural assimilation of residual resources, respectively.

The most direct representation of the planet's carrying capacity assigns a weight directly to the consumer of ecosystem services (use) in units of surface area existing in the biosphere as a whole; the consumer of ecosystem services (production) is calculated based on the main ecosystem service, defining the surface area required to obtain it.

Thus, each year we subtract from nature's capacity to regenerate, the limit of the planet's biocapacity. As aerial ecosystem elements, we subtract soils, forests, fish, terrestrial plants, etc., from the above-ground ecosystem elements.

The percentage derived from each impact is called the percentage of biocapital ratio or %RB, a weighted measure expressed through the supply/demand ratio, both magnitudes expressed in global hectares.

The %RB is distributed proportionally through the % impact on the corresponding cumulative % of the Environmental Footprint, with the % impact weighted monetarily by the price of the biocapital it 'consumes'.

In this sense, the Environmental footprint index (EFI) is a measure that takes into account both direct and indirect consumption, which in a context of globalization represents an advantage of using this type of indicator over traditional ones. In this sense, the EFI was created to attempt to jointly quantify and compare a priori heterogeneous values with the aim of evaluating, using a single criterion, the various environmental loads or drivers of a particular nature that a given type of land and/or ecosystem experiences.

To this end, this new measure attempts to simulate homogeneous values based on the magnitude and relative importance of the main pressures on the environment related to the presence of wastewater. However, the formula for calculating the IHA summarized by biotope or watershed,

EFI = p + (x (k+e))

where:

p = point-origin IHA due to activity i,

x = area of the watershed occupied by activity i in m2,

k = x/3600,

e = confirmed area of impact from activity type k, is limited to following a logical summation sequence, without taking into account all the important characteristics considered: point or diffuse origin, toxicity profile, presence of additional or other contamination, transfer time and affected area, limitation of considering additional time.

To calculate the different factors of the environmental footprint, it would be necessary to use a single unit of measurement, for which the kilogram of CO2 equivalent is chosen. However, it is possible to use a single method to measure the environmental footprint, using the space set aside by humans for their basic needs in square meters.

Defining sustainability indicators that consider the environmental footprint of products and activities in a region demonstrates a commitment to the environment and, therefore, to sustainability. The approval of international agreements seeking to reduce anthropogenic greenhouse gas emissions in developed countries through clean development mechanisms, in collaboration

with developing countries, is becoming an incentive to calculate and monitor the environmental footprint of products, services, and activities. Therefore, the results of such calculations and their monitoring should be used to comply with international obligations, where appropriate, and within countries to support the actions of different sectors toward sustainability.

From a poverty perspective, the indicator contributes to the analysis of sustainability. Through this indicator, we can gain a broader view of the relationships between economies and the environment, observing how certain economic behaviors impact the environment unequally among different economic, social, and political actors. It highlights those with the means and power to transgress the limits of sustainability and ensure, in the short term, the (re) production of a certain pattern of inequalities with high social and economic costs and significant environmental liabilities.

An important aspect to consider when presenting the environmental footprint index is its temporality, as this will negatively influence (albeit in the long term) the Economic Development Index. Therefore, I recommend being attentive to the deterioration of resources that would impact the productivity and quality of the services and products offered to society.

When calculating the environmental footprint of different products, there is a tendency to calculate only the direct or indirect carbon footprint, or the water footprint. However, several people claim that this fragmented view of calculating the environmental footprint does not allow for conclusions to be drawn about the fatal environmental impact of the development and use of different products, and therefore recommend calculating the impact of both in a single footprint.

The carbon footprint is the total amount of greenhouse gas emissions produced directly or indirectly by an individual, organization, event, or product. Defined by the level of activity carried out, the carbon footprint is expressed in terms of CO2 and is measured in kg of carbon dioxide equivalents. Although it is common to limit the footprint to CO2 emissions, it is suggested that the definition of carbon footprint be expanded to also include other sources of emissions not affected by climate change, considering the geocarbon footprint, the blue water footprint, etc., in order to provide a clearer picture of the multidimensional impact of the product on the environment. However, it is not

accepted by the scientific community, so it would not be a possible factor for inclusion in the environmental footprint.

Regarding its calculation, we consider the EFI to be an intuitive and efficient indicator.

The Water Impact calculation is composed of three indicators:

1. Water destination, that is, the percentage of water consumed in goods exported to different countries;

2. Watershed decline, which measures the area's impact due to extraction; and,

3. Availability of green and blue water.

Comparing different EFIs for different countries allows for a quick and easy global comparison of the state of a country's footprints, as well as identifying local impacts.

IV.

Considerations for constructing an indicator

In the indicator construction process, obtaining reliable and regularly updated data is absolutely crucial. The importance of this cannot be overstated. It is of utmost importance to emphasize that reliability trumps exclusivity when selecting data. This means that the focus should be on ensuring data is accurate and reliable, rather than solely on its exclusivity.

However, the advantage lies not only in the reliability of the data, but also in its relevance and timeliness. This means that it is critical to consider how quickly and effectively different data sources can provide the necessary information. This is especially important in a field that is often perceived as slow to reflect the constantly evolving landscape.

Data sources encompass a wide range of statistical databases, national government publications, and surveys. These sources offer a comprehensive and diverse set of information that can be used to gather insights and make informed decisions. By utilizing these sources, one can ensure that the information collected is comprehensive and reflects the true nature of the situation at hand.

The use of diverse data sources can also pose a potential disadvantage, as including multiple data sets requires numerous calculations using data that may not be sufficiently reliable.

It is important to note that no single source is statistically perfect, so the optimal approach is to incorporate a variety of data sources and calculate static average values for coefficients based on nationality and individuals considered similar, in order to mitigate the problems arising from irregular or questionable responses commonly encountered in questionnaires. However, this type of data still raises issues related to its validity, reliability, and availability.

To ensure the essential credibility of research in supporting policy decisions, both the data sources and the data themselves have undergone ex-

tensive validation through a series of checks regarding internal consistency, plausibility, and the reasonableness of the claims made within them.

It should be noted that the reliability of these sources is beyond our direct control; therefore, they have been selected and presented based on their reputation.

Consequently, the data analyzed in this paper extend from 2015 to 2024 (the latter with estimated figures), with a specific focus on examining the association between government indicators and the financial crisis.

Furthermore, future research is expected to cover more recent years, allowing for further verification of the consistency of these indicators.

These indicators were further deemed critical to providing a comprehensive understanding of the topic at hand and therefore merited further research and analysis.

Looking ahead, it is imperative to recognize the constantly evolving nature of the data and its implications. As time progresses, more recent information will become available, necessitating subsequent updates and evaluations of the research. This ongoing commitment to staying current and adapting to emerging trends will ensure the validity and relevance of the findings.

In conclusion, the use of diverse data sources is both an advantage and a potential disadvantage. While it allows for a more comprehensive analysis, it also poses challenges related to reliability and validity.

By continuously adapting and refining the research approach, we aim to provide valuable information that supports informed policy decisions.

The variable selection and weighting process encompasses a total of four dimensions, each encompassing cross-cutting areas: macroeconomic development, socioeconomic development, and institutional development. All of these dimensions were meticulously analyzed and evaluated to ensure a comprehensive and balanced selection.

To ensure the comprehensive selection of variables, a rigorous, in-depth, and extensive analysis was conducted to identify and determine the most relevant and significant elements contributing to economic development within each framework.

The selected variables cover a wide range of market-oriented issues that play a crucial and vital role in shaping economic growth, such as value added and exports.

These variables were also selected based on their demonstrated relevance and impact on economic development, ensuring that the measurement captures the most essential and influential aspects of economic progress. Furthermore, the socioeconomic factors that influence them have also been analyzed, as they have the potential to significantly affect growth rates and provide valuable information on a nation's overall well-being.

Variables related to education, health, inequality, and poverty rates were meticulously assessed and included to ensure a comprehensive understanding of the socioeconomic landscape and its influence on economic development.

These variables serve as crucial indicators and benchmarks, highlighting the interconnectedness and interdependence between the various aspects of a nation's well-being and its economic progress.

To ensure consistency and ease of analysis, a meticulous and robust coding system was established to effectively categorize and quantify the selected variables.

This coding system takes into account various factors, such as the overall institutional framework and its capacity to foster positive socioeconomic activity. It thus ensures that all variables considered are not only relevant but also impact economic development.

The coding system provides a standardized and systematic approach to analyzing the selected variables, contributing to the accuracy, reliability, and comparability of the measurements. Throughout this meticulous selection process, three important criteria were diligently applied to ensure the highest quality and relevance of the chosen variables.

First, each variable had to demonstrate its relevance and significant contribution to economic development, ensuring that only the most crucial and influential factors were taken into account.

Second, the measurement of the chosen variables had to be feasible, ensuring that data collection and analysis could be carried out accurately, effi-

ciently, and consistently. This criterion ensures that the measurement process is practical, reliable, and sustainable for capturing and evaluating economic progress.

Finally, the selected variables had to have a significant impact, highlighting their importance and influence in shaping the economic landscape and overall well-being.

This criterion ensures that the measurement focuses on the most impactful and transformative factors that contribute to a nation's progress and economic potential. Using a meticulous, comprehensive, and multidimensional approach, the variables used to measure the economic development indicator have been carefully selected to ensure the highest level of accuracy, reliability, and comprehensiveness.

This careful selection process ensures that the resulting measure provides a reliable and comprehensive assessment of a country's economic progress and potential, offering valuable information to policymakers, researchers, and stakeholders alike.

By considering a variety of dimensions, factors, and variables, this selection process enables a holistic and multifaceted understanding of economic development, contributing to the formulation of effective policies, strategies, and interventions that promote sustainable and inclusive economic growth.

With a thorough understanding of the complexities involved in the variable selection process, stakeholders can make informed decisions that foster economic prosperity and development.

In addition to the criteria mentioned above, there are various techniques that can be used to introduce significance levels for variables.

A common approach is to apply uniform basic weights to all variables, which assumes that all dimensions of the overall measurement have the same weighting. However, it is well known that certain characteristics, such as inequality or financial development, show greater sensitivity to GDP growth in specific development processes.

Furthermore, there is a theoretical belief that macroeconomic growth is influenced by a country's level of human development, education, and use of natural resources.

To empirically justify the weights assigned to the variables, regression and correlation analysis have been used, to the extent possible.

By performing these analyses, statistical associations between variables can be identified and potentially relationships between them can be established, as was the case with the construction of the two coefficients of variation presented in the formula designed for the proposed construct of the Economic Development Index.

Additionally, theoretical economic models can provide theoretical support for observed associations, although they may not fully capture the complexities of real-world dynamics. However, researchers must be cautious when interpreting the results of these techniques, as they cannot necessarily establish causal relationships. While these techniques provide valuable insights, it is important to recognize their limitations.

For example, regression and correlation analyses are limited to exploring statistical associations and cannot definitively establish causality. Similarly, theoretical economic models may not capture all the complexities of real-world phenomena. Therefore, it is critical to consider the results obtained using these techniques as part of a broader analytical framework.

To improve the reliability and validity of the proposed construct application, researchers must balance theoretical considerations with empirical data. By considering diverse factors and perspectives, researchers can gain a more complete and nuanced understanding of the relationship between variables and their effects on the overall measurement.

Adopting this holistic perspective contributes to the robustness and validity of research results and ultimately advances knowledge in this field. However, it is important to recognize that no single technique can provide a definitive answer. The combined use of these techniques, along with a critical assessment of their limitations, forms the basis for a rigorous and comprehensive analysis.

Expanding on this topic, it should be noted that variable selection plays an important role in the outcome of the analysis. By including directly related variables, one can ensure that the analysis captures the essence of the topic at hand.

Furthermore, the importance of the dimensions within the measurement must be equalized to avoid bias in the results. Each dimension must be considered fairly and weighted accordingly.

This ensures that no single dimension disproportionately influences the overall measurement. In terms of empirical justification, regression and correlation analysis provide valuable insight into the relationships between variables.

By identifying statistical associations, a deeper understanding of how variables interact with each other can be gained, as demonstrated by the Gaussian Bell curve in the construction of the SDI. However, it is important to note that correlation does not imply causation. While statistical analysis can uncover strong relationships, caution is needed when making causal claims based solely on correlation.

In addition to statistical analysis, theoretical economic models can also support observed associations. By creating theoretical models that incorporate the variables under study, their findings can be validated and a framework for understanding the underlying mechanisms can be provided. It is important to remember that economic models are simplifications of the real world and cannot capture all the complexities and nuances of real-world dynamics.

Considering the limitations of these techniques, it is essential to consider the results within a broader context.

It is also important to recognize that no single technique can provide a definitive answer. Instead, a combination of techniques, along with a critical assessment of their limitations, forms the basis for a rigorous and thorough analysis.

In conclusion, the use of various techniques, such as regression and correlation analysis, the Gaussian bell curve, and theoretical economic modeling, can provide valuable information about the relationships between variables.

The latter is a simplified and objective representation of economic reality that seeks to explain economic behavior, since it is based on the assumption that economic agents maximize their objectives, complying with well-defined restrictions.

Some models analyzed and considered in this work are: supply and demand, Keynesian, economic growth, general equilibrium, business cycle, rational choice, and monetary.

It is essential to recognize the limitations of these techniques and consider the results within a broader analytical framework. By carefully selecting variables, equating the importance of dimensions, and balancing theoretical considerations with empirical data, research can improve the reliability and construct validity of its findings.

In addition, normalization is a very effective technique used in data analysis to ensure that diverse data sets can have different physical units and ranges, so that they become comparable units.

This process leads to the creation of a "normal measure," which allows for meaningful comparisons and evaluations. To achieve this, various normalization methods can be employed, ranging from simple percentage-based approaches to more complex techniques that leverage statistical functions such as mean and standard deviation.

Essentially, normalization seeks to establish uniformity between data sets when there is no prior knowledge about the distribution of data values. Ratio-based normalization methods, such as the popular min-max scaling, can be invaluable.

When implementing min-max scaling, data values are approximated to fall within ranges of 0 to 1 (Gaussian Bell Curve), or 0 to 100 if percentages are required. This involves first normalizing the values and then transforming them to fit the desired range.

This technique facilitates data interpretation and analysis by aligning them to a standard scale and eliminating any potential bias arising from the original units and ranges.

This way, accurate information can be obtained and sound decisions can be made based on standardized results.

Overall, normalization provides researchers with a robust and versatile tool to ensure consistency and comparability across diverse data sets.

The importance of normalization in data analysis cannot be underestimated, as it serves as the basis for drawing accurate and reliable conclusions.

Without normalization, data interpretation can be prone to errors and misrepresentations, leading to erroneous conclusions and flawed decisions. Furthermore, normalization offers several advantages beyond its primary goal of comparability.

It improves data visualization by enabling meaningful comparisons of graphs and the identification of patterns, trends, and outliers.

Furthermore, normalization can support machine learning algorithms by improving their performance, as models are often based on data with similar ranges and scales.

Furthermore, normalization facilitates feature selection in predictive modeling by preventing certain features from dominating the analysis due to their larger magnitudes.

When considering the dimensionality of data, normalization can be particularly useful. In high-dimensional spaces, where data sets contain numerous attributes or features, normalization helps alleviate the curse of dimensionality.

This refers to the challenges associated with analyzing and interpreting high-dimensional data, such as increased computational complexity and lower predictive accuracy.

It is worth noting that while normalization is a powerful tool, there are certain scenarios in which it may not be necessary or appropriate.

For example, if the data already exhibits the desired scale and uniformity, normalization may not provide significant benefits. Similarly, in cases where interpreting raw data values is crucial, normalization can distort the original meaning and hinder understanding. In these situations, caution should be exercised and alternative approaches considered. In conclusion, normali-

zation is a fundamental technique in data analysis that ensures comparability, consistency, and reliability across diverse data sets.

Its application allows you to transform data into a standard scale, eliminate biases from different units and ranges, and take full advantage of the available information.

By selecting appropriate normalization methods tailored to the specific characteristics of the data, analysts can obtain accurate information, make informed decisions, and contribute to the advancement of knowledge in various fields.

With its broad benefits, normalization remains a cornerstone of effective data analysis and interpretation.

A comparison of normalization methods demonstrates that min-max scaling, with an upper bound of 1 and a lower bound of 0, is an effective method due to the constraints on the end of a ratio and the data locks to a central point. Therefore, the range can be reduced from 0 to 1, or from α to β, using the min-max normalization method.

A particular challenge is the lack of bounds, which can lead to outliers and skewed distributions. In contrast, min-max scaling presents a different approach that involves mapping values within a specific range, typically between 0 and 1. This approach offers clear upper and lower bounds, making it suitable for certain scenarios where a normalized range is desired. However, min-max scaling can suffer from limitations when dealing with extreme values.

Despite these considerations, both normalization methods have their merits and can be effectively applied depending on the nature of the data and the intended analysis. The choice between these two methods depends on several factors, such as the nature of the data set and the specific requirements of the analysis.

For example, if the data set consists of variables with known upper and lower bounds, min-max scaling may be more appropriate, as it allows the values to be mapped within a predefined range, ensuring that the normalized data remain within the desired limits.

On the other hand, if the data set has a more complex distribution and the goal is to transform the data into a standard normal distribution, Z-score normalization would be the method of choice.

By removing the mean and scaling based on the standard deviation, this method ensures that the transformed data follow a bell-shaped curve, which is especially useful in statistical analyses.

However, it is important to consider the potential limitations of each method.

Z-score normalization, for example, imposes no limits on the transformed values, which can lead to outliers and skewed distributions.

This is a crucial factor to consider when working with data sets that may contain extreme values.

On the other hand, min-max scaling may not be suitable for data sets with extreme values, as it tends to compress the range of values toward the upper and lower limits.

This compression can result in a loss of information, especially if the extreme values have significant significance or contribute to the overall analysis.

In summary, both min-max scaling and Z-score normalization offer valuable techniques for normalizing data. The choice between the two depends on factors such as the nature of the data and the intended analysis.

V.
Economic Development Index Construct

Access to well-being must go beyond achieving it; it is essential to maintain it over time and ensure upward mobility. For this reason, and based on the premise that there is a common construct that unites all the topics studied, the creation of an Economic Development Index (EDI) is proposed.

An index that integrates the most relevant economic variables for economic development into its design would allow both those responsible for public policy in nations to evaluate their own performance, measuring the impact that the implementation of each of the measures they implement has on their overall index, and also allow analysts to compare performance with that of economically and/or geographically similar countries. This would facilitate the evaluation of these policies and promote the flow of ideas that enables the exchange of experiences and knowledge. International organizations pursue similar objectives by promoting the exchange of experiences in the area of social development through the preparation of various annual reports composed of dozens of sectoral indicators.

As a first step toward addressing this situation, it is essential to have an index that integrates into its design and measurement the main economic variables linked to the public policies promoted by each country to foster its development. The real possibility of valid and internationally comparable measurements would lead, on the one hand, to better management by those responsible for public policy in each country and to improved monitoring capacity, both political and technical, by other analysts. On the other hand, but primarily linked to less-advantaged and less-developed countries, it would be a key tool for addressing a true globalization process that does not end up harming the less-advantaged countries and promotes genuine international cooperation efforts by developed countries.

The Economic Development Index (EDI), by virtue of its theoretical and practical considerations in assessing economic well-being, not only plays a leading role in evaluating the development of nations, but is also becoming a vital tool for fostering effective public policies. Indeed, the philosophy behind the EDI is that a nation's economic development is measured not only in terms of annual growth in output, but also in the actual growth of its population, generated by social mobility, which can be translated into demographic growth derived from the quality of life achieved by its inhabitants.

Therefore, once a country's index is known, it is possible to identify and classify areas where this will depend primarily on each country's capacity to economically mobilize its citizens, within its mobility spaces. That is, by promoting policies that foster each of the economic sectors within each area. In this way, there are sometimes a set of more manageable and effective public policies, propelling the country in a modern direction, thus shifting its economic flows and citizens in certain directions.

The application of an Economic Development Index allows for the study of other aspects of development, comparing them, and identifying differences when designing public policies to have a positive impact on its population. The way in which the importance of the different dimensions of an index is determined must also include a monitoring system over time to observe how each dimension evolves. For this monitoring system to be successful, methodologies must be developed that allow for the production of data that can be monitored periodically.

The new economic development indicator, presented as a proposed construct, serves impeccably and exquisitely as an extremely critical, indispensable, and essential complement to the extensive and current set of indicators used to analyze, evaluate, and scrutinize social well-being.

This indicator promises to revolutionize and transform the way economic development is assessed and understood, paving the way for more efficient decision-making, targeted interventions, and inclusive growth strategies.

Using this revolutionary new economic development indicator, the results obtained from its application will set the tone for generating knowledge, identifying the existing problems that hinder each country's development, and modifying the strategies that drive it.

The construction of the proposed new indicator serves as a valuable addition to the existing theoretical discussions surrounding the proposed economic development indicators addressed in the previous sections of this paper.

The formula presented for estimating the proposed economic development indicator is versatile and can be effectively applied in diverse settings, encompassing both developing and developed countries.

Furthermore, it offers a deep understanding of economic growth and progress, enabling policymakers and researchers to make informed decisions and strategies for sustainable development.

In addition to its global relevance, the formula can be adapted accordingly to different economic systems, whether capitalist or socialist, or to any economic model, due to its practicality and the combination of indicators used, ensuring its implementation and adaptability.

By incorporating this innovative indicator into economic analyses, a new realm of possibilities and insights is unlocked, bridging the gap between economic theory and real-world applicability.

The expanded text demonstrates the immense value of this new indicator, as it provides a comprehensive framework for assessing and monitoring economic development on a global scale.

In addition to formally estimating the indicator's value, the proposed formula can also be employed in practical scenarios to generate intuitive and illustrative judgments about economic progress over various time periods, in different sectors and/or nations.

The expectation is that the new indicator, as configured, will provide valuable insights into the indicators that need to be monitored to unlock the economic development of the country in which the formula is applied.

By examining the constructed indicator, one can not only form a formal estimate of its value but also apply it to real-life situations to derive intuitive and illustrative judgments about a country's economic progress over different time periods and sectors.

By leveraging the strength of its natural resources, investing in strategic sectors, and engaging in collaborative partnerships, every country aspires to become a global leader in sustainable development.

The journey will not be without obstacles, but with determination and a clear vision, every country will be prepared to overcome them and move toward a brighter and more prosperous future.

By taking bold steps, investing in research and development, and fostering international partnerships, every country will be driving positive change and leaving a lasting legacy for generations to come.

In theory, the quality of an economic development indicator includes three criteria: reliability, providing comprehensive information in a single number, and interpretability for policy advice.

Looking at examples of economic indicators, it becomes clear that these criteria are not fully met. However, they can serve as an example of the following: different indicators provide partial information.

Within the framework of this study, these indicators can serve as potential building blocks for the development of a new one. They focus on partial information and differ in their approach. It is also acknowledged that the present proposal for a hypothetical indicator does not actually meet the equal validity of the three criteria, particularly with regard to the issue of interpretability.

Stakeholders familiar with the proposed construct argue, in part, that the newly developed indicator adds considerable value to existing measures, in that it locates information about growth that may not be captured using other measures; it corresponds to external and internal perceptions of what constitutes economic development. It is similar to existing indicators.

The extensive research conducted to develop quality, comprehensive indicators of economic development across three different sets of indicators aimed to address and circumvent several potential challenges. One of the main concerns was the presence of conditional systematic errors, which have the potential to introduce bias into the estimated values, thus undermining the reliability and credibility of the constructed indicators.

Furthermore, it was crucial to avoid systematic errors in wealth measurement, as these errors not only produce invalid indicators but also have the potential to mislead and misinterpret exclusionary results. Panel approaches were implemented to account for possible external economic and political variations in the Kuznetsian process.

These approaches have proven effective in considering and adjusting for any changes that may arise due to external factors. It is important to continually adjust and rebalance the indicators, ensuring that a constant and fixed position is maintained. This process is comparable to reconceptualizing the notion of development, treating it as a dynamic function with the inherent capacity to improve people's quality of life. If different variables are employed, it is imperative to establish a contextual basis that allows for a thorough examination and evaluation of the indicators. In doing so, a comprehensive understanding of the complex dynamics and nuances of economic development can be achieved. This contextual basis serves as a fundamental framework for analyzing the indicators and discerning their true meaning and implications.

Ensuring that a large amount of data is accessible is critical to obtaining timely findings, which will enable trained individuals to use this information more efficiently to produce results.

Another area of concern closely related to data availability is the quality of the data itself. Building the SDI requires robust and reliable raw data, as well as intermediate data.

Relying on outdated or incomplete data can render the entire evaluation meaningless and impede progress in evaluating the work.

These data sources have been meticulously categorized based on the countries where development indicators are diligently studied and worked on. Data availability and quality play a vital and indispensable role in the successful acquisition of rapid findings. A large amount of data is imperative to facilitate the more competent generation of results by experts. Furthermore, the caliber and integrity of the data itself are closely related to its availability.

Obtaining reliable and robust raw data, as well as intermediate data, is critical to designing the EDI.

Relying on outdated or deficient data can negate the entire assessment, thus impeding progress in the evaluation work.

Great care and thoroughness have been taken to efficiently categorize these data sources based on the countries where development indicators are meticulously analyzed and diligently worked on.

The primary strategy is to effectively address and overcome existing data gaps, which is of utmost importance as it allows for a more complete and accurate representation of the topic. Furthermore, it ensures that the data provided is sufficiently reliable and comprehensive to serve as a valuable resource for informed decision-making and policymaking.

To achieve this goal, a multi-step approach is applied with great determination and vigor, ensuring that the dataset created is robust and comprehensive. This multi-step approach involves the implementation of multiple alternative methods for constructing indicators.

These methods are carefully chosen to provide a diverse and comprehensive set of data points that capture the complexities of the social, economic, and political phenomena under examination.

By utilizing multiple methods, the accuracy and depth of the dataset are significantly improved, allowing for a more nuanced understanding of the topic. One of the key strategies employed in this approach is data triangulation.

Data triangulation involves utilizing data from a variety of sources, both governmental and non-governmental, to ensure a complete and accurate representation of the topic.

This strategy allows for cross-referencing and verification of data, reducing the likelihood of inaccuracies and biases. Engagement and collaboration with relevant government authorities play a vital role in this strategy, as their knowledge and expertise contribute to the reliability and credibility of the data. To ensure the highest quality and reliability of the data, two critical strategies are implemented.

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First, collaboration with local research institutions is sought, as this provides access to updated information that is still being collected or verified before official publication. This strategy ensures that the dataset remains up-to-date and relevant, providing the most accurate and reliable information possible.

Second, internal triangulation or cross-checking is employed to effectively identify and rectify any potential errors, omissions, or gaps that may exist in the dataset.

This process involves the use of qualitative data and interviews conducted in operational settings, complemented by the consultation of relevant literature.

By conducting such comprehensive cross-checks, the validity of the dataset is further strengthened. By adopting these aforementioned approaches, a robust and comprehensive framework is established, leading to the creation of a comprehensive and reliable dataset.

The integration of diverse methods for data collection, analysis, and verification significantly improves the accuracy and depth of the dataset, allowing for a more nuanced understanding of the complex social, economic, and political phenomena under examination.

Furthermore, the utilization of a wide range of data sources and collaborations with prestigious research institutions and government authorities fosters a cooperative environment that promotes transparency, accountability, and knowledge sharing.

By implementing these multifaceted strategies, the potential for inaccuracies, biases, and data gaps is significantly minimized, ensuring the provision of accurate, timely, and relevant information essential for effective planning, monitoring, and evaluation.

This comprehensive approach not only strengthens the validity and reliability of the dataset itself but also enhances the overall credibility and reliability of the findings derived from it. As a result, evidence-based deci-

sion-making processes are facilitated, leading to the achievement of sustainable development outcomes and promoting overall social progress.

Ideally, data updates should be conducted continuously and proactively to effectively capture the constantly changing landscape of an economy.

This is primarily due to the imperative to mitigate the looming threat of obsolescence and recognize the inherently dynamic and fluid nature of economic activities. However, in practice, various constraints, such as time limitations, resource allocation, and budgetary restrictions, often prevent the realization of this ideal scenario, leading to a substantial waiting period of approximately one or even two years before another round of full and comprehensive data collection.

This waiting period assumes utmost importance due to the absolute need to ensure the consistency, cohesion, and integrity of certain multifaceted measures over an extended period, thereby greatly improving the overall completeness, accuracy, reliability, and validity of the collected data. By allowing for a longer timeframe, it is possible to comprehensively analyze economic trends, identify patterns, and make informed decisions based on reliable and robust data.

Furthermore, this extended waiting period also constitutes a crucial opportunity for thorough quality control, data verification, and robust validation processes to be carried out, ensuring the accuracy, consistency, and credibility of the collected data.

Therefore, while there may be limitations that impede the frequency of data updates, it is essential to recognize the critical role of this waiting period in providing reliable, comprehensive, and insightful economic data that can drive informed decision-making, policymaking, and strategic decisions.

The importance of this waiting period cannot be underestimated, as it allows for a more rigorous and comprehensive examination of economic indicators and trends, facilitating a deeper understanding of the complex dynamics at play.

Furthermore, this extended period of data collection and analysis fosters a sense of confidence in the findings, as it ensures that the data presented is not simply a snapshot in time, but a comprehensive representation of the economic

landscape over a significant period. During this waiting period, stakeholders have the opportunity to delve into the intricate details of the data, identifying correlations, causal relationships, and potential risks.

This deeper level of analysis allows for the formulation of targeted strategies and interventions, addressing specific challenges and maximizing opportunities for growth and development. It also enables policymakers to anticipate future trends, ensuring that decisions made are in line with the evolving economic landscape.

In conclusion, while limitations in data updates can hinder the timely availability of economic indicators, the waiting period serves a crucial purpose in ensuring the accuracy, reliability, and comprehensiveness of the data collected.

Furthermore, there is considerable subjectivity and bias when analyzing the indicators and definitions used in their construction, as they often reflect the theoretical perspectives of researchers or those in close communication with national statistical agencies.

As a result, the choice of variables and the weighting or relative importance assigned to them is often characterized by the theoretical position of the indicator's author. Furthermore, the cultural, ideological, and historical perspectives of these authors may be reflected in the selection of alternative indicators.

Therefore, the actual choice of a variable is subject to the personal bias of researchers regarding certain variables, the political relevance of the indicator in question, and the degree to which a wide range of potential users agree with the choices made.

This is clearly the case with indicators reflecting living standards, which are frequently intertwined with the particular culture and social structure of the society in which they are constructed.

Similarly, the interpretation of indicators depends on their general level of construction, the historical circumstances in which they are used, and the actual framework used to develop the particular indicators.

This can lead to inconsistencies in the general understanding of the indicator itself and its use.

Another issue is that indicator development is, as a rule, driven by the good intentions of researchers or policymakers.

However, it is not unlikely that researchers narrow their indicators too much. In other words, they may lose a good sense of how external users might interpret their indicators, especially if the researcher has been working on them for a long time.

Therefore, expanding and refining indicators requires constant evaluation and validation by multiple stakeholders.

The input used in constructing these indicators must encompass diverse perspectives, ensuring a comprehensive representation of societal characteristics.

Collaborative efforts among researchers, policymakers, statisticians, and society at large are crucial for a robust indicator framework that accurately captures the complexities of the world.

Involving a wide range of users throughout the indicator development process promotes transparency and reduces the influence of personal biases.

Furthermore, it is important to recognize that indicators are not static entities, but rather dynamic tools that evolve with changing social dynamics.

As new knowledge and understandings emerge, indicators must be adapted to remain relevant and reflect current realities.

Open dialogue and ongoing feedback mechanisms help identify potential deficiencies or gaps in the indicator framework, allowing for timely revisions and improvements.

Additionally, the interpretability of indicators is of utmost importance. Clear and concise communication of the underlying concepts and methodologies enables users to make informed decisions and use indicators effectively.

In conclusion, while indicators provide invaluable information on various aspects of society, it is crucial to recognize their inherent subjectivity and the potential for personal bias.

By developing indicators inclusively, periodically reassessing their relevance, and improving their interpretability, a more comprehensive and objective understanding of the multifaceted dimensions of our world can be fostered.

Through collaborative efforts and continuous improvement, indicators can significantly contribute to evidence-based decision-making and the advancement of societies worldwide.

This collective effort ensures that societal progress is based on accurate, reliable, and inclusive indicators, leading to a more equitable and sustainable future for all.

Although the proposed Economic Development Index (EDI) provides an informative and comprehensive view of current economic conditions in Mexico, there are numerous avenues through which the indicator could be refined and further developed. This text, as the pioneering attempt to establish this measure of economic development, highlights two key future directions that merit attention.

First, it is critical to refine future iterations of the index based on user feedback.

To continually improve its informative quality, it is imperative to provide researchers, policymakers, and other stakeholders with the opportunity to engage and critically evaluate the measure.

By actively seeking feedback, the EDI can evolve and adapt to the ever-changing dynamics of the economic landscape, ensuring it remains a reliable and relevant tool.

Second, as an index, the nature of the EDI requires its constant evolution to accurately capture the macroeconomic conditions of the countries it assesses.

With this in mind, future directions in the EDI's development should aim to remain relevant and aligned with the evolving economic landscape.

To this end, a logical progression in development would involve testing the impact of the EDI on a wide range of theoretical models of entrepreneurial behavior.

This can be achieved by utilizing confirmatory factor analysis of panel data across more advanced countries and structural equation modeling.

Such a comprehensive approach would further ground the findings obtained through principal components analysis and facilitate the exploration of a more consistent weighting mechanism for each criterion.

In the longer term, it would be beneficial to reflect on the main frameworks, principles, and practices advanced by major contributors to global economic development.

By incorporating their proposals, the EDI can gain a more holistic and comprehensive perspective. However, it is important to recognize that this undertaking would be a project in itself, potentially requiring the inclusion of sub-indices that address specific types of economies. Therefore, the scope for future research in this study is broad and promising.

Given the rapid pace of change within the macroeconomic literature, coupled with the intricate interrelationships between macroeconomic variables, central bank policies, and political systems, it is critical that the development of the EDI be conducted in collaboration with stakeholders who would regularly use this measure. By fostering partnerships with these entities, the EDI can be enriched and maximize its effectiveness.

Together, through collaboration and ongoing research, we can ensure that the EDI remains an indispensable tool for understanding and assessing economic development in all countries.

Furthermore, it is essential to recognize the potential impact of technological advances in shaping the future of the EDI, and therefore this item is part of the Economic Conversion Factor (ECF) that forms part of the proposed formula for the construct.

By harnessing the power of emerging technologies such as artificial intelligence, big data analytics, and machine learning, the EDI can greatly enhance its ability to capture, analyze, and interpret complex economic data.

Furthermore, the EDI can benefit from adopting a more multidimensional approach by incorporating several socioeconomic indicators that go beyond traditional economic measures.

By capturing broader aspects such as social inclusion, environmental sustainability, and governance, the EDI can provide a more comprehensive assessment of a country's overall development.

In conclusion, while the proposed EDI is already a valuable tool for assessing economic development, there is significant room for further expansion and refinement. By incorporating user feedback, embracing technological advances, adopting a multidimensional approach, and promoting international collaboration, the EDI can evolve into a more robust and inclusive measure.

It is important to recognize that the focus of this type of exercise should not be limited to just two or five indicators/mapping functions. Instead, we should conduct experiments with a "smaller" number of variables that produce the hypersurface arrival rate.

Furthermore, these experiments can help identify areas with constant or identical growth rates. However, it is worth noting that incorporating additional variables has the potential to reveal distinct transitions, which can be equally intriguing. By including more variables, we have the opportunity to uncover important patterns and trends. However, it is critical to note that a hypersurface based on two or three variables can be excessively complex to analyze if reproduced in three or four dimensions.

Therefore, to simplify the final representation, we can use adaptive weighting schemes that vary by location. These schemes can select a subset of variables that are most valuable for characterizing the transition state at each specific point. Through this adaptive approach, we can limit the variables and focus on the most crucial factors, thereby reducing complexity without sacrificing important insights. Expanding the analysis further, it is worth noting that including additional variables can lead to distinctive results. By incorporating a broader range of indicators, we can shed light on new connections and gain a comprehensive understanding of socioeconomic development.

These diverse variables offer alternative perspectives and can reveal previously overlooked patterns. Through this adaptive approach, we can effectively limit the variables under scrutiny, streamlining our approach without sacrificing the vital insights they provide. Thus, the proposed construct suggests taking into consideration two variables that, in the medium to long term, can

negatively influence the results obtained by, among other things, decreasing societal productivity and the quantity and quality of production inputs; these are the demographic aging index and the environmental footprint index.

In conclusion, expanding our experiments to encompass a broader range of variables has great potential to illuminate novel patterns and trends within socioeconomic development. By carefully incorporating additional indicators and employing adaptive weighting schemes, we facilitate the identification of notable transitions and gain deeper insight into the underlying mechanisms. These strategic improvements will allow us to navigate the complex landscape of socioeconomic development with clarity and precision.

Beyond this, the concept is ideally suited to emerging economies, given the unique challenges they face in terms of data scarcity, developing institutions, rapid dynamics, and unpredictable future developments. It is worth noting that these countries would benefit immensely in numerous ways from implementing this concept.

Since the global development discourse generally operates with structural economic indicators, it is remarkable and fascinating how the concept aligns perfectly with global perspectives and opens up new possibilities.

Emerging economies occupy a special and fundamental niche in the global economic structure, given their immense potential for rapid economic growth and industrialization. However, they also face persistent development challenges, such as high rates of income inequality, significant infrastructure deficits, and persistently high unemployment rates.

Therefore, it is increasingly evident that the creation of an index like the one proposed in this study is not just an option but an essential step toward progress. This essential index would be based on internationally accepted criteria, draw insights from various complex data sets, and take into account contextual factors beyond economic data. It would be further refined with expert input, including that of the local population, who have an innate understanding of their own unique challenges and opportunities. With such a comprehensive index, integrated and sustainable development can be successfully shaped and implemented.

The index would provide a comprehensive assessment of the socioeconomic landscape, considering not only economic factors but also social, cultural, and environmental aspects. This holistic approach will lay the foundation for sustainable development and inclusive growth.

This proposed EDI serves as a basis for effectively monitoring the evolution of economic development within any given community and plays an irreplaceable role in fostering the implementation of policies that have the potential to foster sustainable growth and development. It is of utmost importance to recognize that the improvement of any public institution ultimately depends on the harmonious cooperation and collaboration of the entire community.

The versatile EDI, as an implementable aggregate index, is not only applicable to nations but is also highly adaptable to a wide range of territorialized entities and policies, such as regions and even cities.

It addresses the diverse needs and requirements of academia, social administrations, and society at large, effectively promoting economic development on multiple fronts.

The successful adoption and optimal suitability of the proposed index in various contexts depend largely on shared cooperation and the continuous integration of all the variables inherent to the comprehensive EDI.

The eternal quest by economists and politicians to measure the economic and social progress of nations through a performance indicator entails countless difficulties. The main culprit is that not everything that is worthwhile can be measured.

In part, this situation has hampered some economic indicators, such as GDP or the HDI (Human Development Index), which have not done everything well but have attempted to offer a simple way of studying the issue. In recent decades, other indicators, such as the GPI, have emerged, incentivizing alternative methods.

With the incorporation of the Sustainable Development Goals (SDGs) into international agendas, the Genuine Progress Index (GPI) has been deemed to provide a more accurate picture of economic development relative to Gross Domestic Product (GDP). Its use is relevant because the SDGs can provide guidance and prioritize investments that help achieve progress. Innovation

has become a fundamental pillar of the GPI, to the point that if its authors had decided to eliminate this indicator, the different versions of its calculation would have yielded a combination of different indices.

Thus, the objective of the Economic Conversion Factor is to demonstrate whether the Global Innovation Index (GII) leads to an improvement in the level of progress of its constituent countries.

This paper is structured into the following sections: the second section summarizes the GPI calculation methodology, followed by a discussion of the GII.

The third section focuses on the statistical analysis of the two indicators.

The fourth section will discuss the limitations and, finally, the fifth and last, the results obtained.

It is worth mentioning that international studies highlight the poor utility of the gross domestic product, or the human development index, or, as is the case, the genuine progress index (GPI). These studies reveal that the GPI offers a more accurate view of economic reality because it integrates both production and consumption factors. These studies question the GPI because it does not truly reflect a country's economic dimension. At the same time, it encourages organizations with growth models that are not ecologically sustainable.

These studies reveal that the GPI offers a more accurate view of economic reality because it integrates both production and consumption factors. These studies question the GPI because it does not truly reflect a country's economic dimension. At the same time, it encourages organizations with growth models that are not ecologically sustainable.

When comparing both indicators, it is important to remember that the GPI measures a country's true progress, while the Global Innovation Index reflects each country's level of capacity and results in the fields of science, technology, and innovation.

Thus, a higher GPI score is expected to correlate with a higher quality of life for the population. Conversely, a higher GII score is expected to indicate that the country falls into a high-income group or anticipates its rapid change from one group to another. Each of these additional characteristics is

supported by the ordinal scale used in this case, subdivided into meta-categories determined by consensus among experts in the field.

Similarly, the Well-being Conversion Factor is supported by the Human Development Index and complemented by the Happiness Index. The analysis of why these two indices were chosen is presented separately.

In all cases, all indices were calculated on a scale of 0 to 10 (including the GINI), in order to standardize the results and thus suggest that the Economic Development Index be scaled from 0 to 30. That is, to promote the generation of three segments: 0 to 10, 10 to 20, and 20 to 30.

0 to 10 = Low Economic Development Index

10 to 20 = Medium Economic Development Index

20 to 30 = High Economic Development Index

Thus, the proposed formula for determining the Economic Development Index is:

EDI = GDP + ECF + WCF–Gini

Where:

EDI = Economic Development Indicator

GDP = Gross Domestic Product

ECF = Economic Conversion Factor (includes the conjunction of the GPI and the GII)

GPI = Genuine Progress Index

GII = Global Innovation Indicator

WBF = Well-being Conversion Factor (includes the conjunction of the HDI and the HI)

HDI = Human Development Index

HI = Happiness Index

Gini = Poverty Index

Economic Conversion Factor (ECF)

Since 2007, the Government of Aragon in Spain, has presented the report corresponding to the Genuine Progress Index, which seeks to reflect the sustainability of a territory or region across four pillars (economic, social, ecological, and governance), both qualitatively, through direct descriptions and indicators, and quantitatively, using aggregation techniques and the construction of composite indices.

The Global Innovation Index (GII) is one of the most highly valued indicators for measuring innovation globally, providing detailed information on 142 countries for the years 2007 and 2008. That said, it is worth mentioning that this index includes 84 indicators that assess the innovation capacities of the countries and regions analyzed. The latest edition of the GII, presented in 2024, was developed by INSEAD University, the Business School, and Alleanxe, between CNI and Omintel, with the support of the World Intellectual Property Foundation.

Lévy, Lebot, Passet, and van der Mensbrugghe presented and developed the first "Genuine Country Progress" index, which has already been adopted by several states. Its main advantage lies in the fact that it reconciles the issue of temporal compatibility with general well-being, and also allows for an assessment of the extent to which the results of this communication align economic and social performance with overall well-being.

They also allow for the analysis of the temporal profiles of well-being increases achieved by a specific territory, the factors that have contributed to their increase or decrease, and the evaluation of the different policies developed in each subdimension that have been more or less successful over time.

The index they calculated also made it possible to compare the levels of genuine progress between countries or territories with their nearby counterparts, derived from Gross Domestic Progress.

In the case of so-called "emerging" countries, even with GDP values higher than those achieved by developed territories, very few achieve values above 4%, and several show a decline in net domestic progress.

For its part, the Global Innovation Index measures the key elements of innovation relevant to growth and development in the economic sector by identifying, regionalizing, and evaluating dynamic elements of innovation.

The Index is based on several key terms such as: innovation, economic development, scientific behaviors, and key factors.

For the Global Innovation Index, indicators have been established that measure the existing inequalities between the world's nations in terms of scientific innovation and attitudes toward these inequalities in the generation of knowledge and scientific attitudes.

The combination of the Genuine Progress Index with the Global Innovation Index is proposed. The former serves as a starting point for researchers to compare and analyze the specific context of genuine progress indicators in their country of origin, creating a ranking of countries with a trend of continuous growth. The latter will provide trends in production and productivity when technical and technological advances are applied and their impact on public policymaking.

Traditionally, performance measurement in science, technology, and innovation focuses on quantitative indicators, reflecting an emphasis on the "what" of the strategy and omitting the "how," sometimes obscuring the efforts and barriers faced by the most backward regions in pursuit of convergence, despite achieving significant increases in aggregate levels of investment and knowledge production.

As a result, the Global Innovation Index was published by Cornell University, INSEAD Business School, and the World Intellectual Property Organization. This index is already a benchmark in the world of innovation and is widely known by the organizations responsible for establishing guidelines for action in this area.

It describes the performance of 126 economies in terms of innovation as a strategic means capable of fostering long-term economic growth, sustainable development, and general well-being.

Regarding innovation, it is noted that it is key to any business strategy, and that it is also feasible for small and medium-sized organizations to innovate and benefit from it; that is, it is not only within the reach of large organizations.

Innovation is defined as both a public and private good. It indicates that research and development determine basic knowledge that, outside the purview of the inventor or discoverer, is public property, since there are no effective means to prevent its access to others.

In this context, a statistical analysis of the GPI was conducted, followed by a correlation analysis to determine its association with innovation. To this end, 135 nations were selected, resulting in a total of n=267 original data points.

The statistical treatment applied was as follows: rank and percentiles, those ranked above the bottom 10%, and those ranked above the 90% (called elite, which was only observed in negative indicators). This also led to a cutoff of 9.1% of the averages, the same as the segment below 83.3%.

Regarding the degree of association between the GPI and the Global Innovation Index, the strength and direction of the relationship between the variables were examined using Pearson's correlation coefficient (r), also known as the productivity coefficient. According to the Chebyshev and Zalkind procedure, the theoretically normal distribution of r above 30 (a sufficient level or close to it) should and can be checked to see if it fits the theoretical parameters using the Kolmogorov-Smirnov Test, or with the equivalences according to which r should not differ significantly from what the aforementioned authors propose.

The results of combining the Genuine Progress Index (GPI) with the Global Innovation Index (GII) showed a positive impact on innovation and the implementation of public policies favorable to R&D.

One of the most relevant conclusions of this study is that while the Global Innovation Index shows Latin America as a region that has remained constant in its capacity for innovation, the Genuine Progress Index shows an underlying dynamic related to the different year-on-year sustainable growth rates. Both indicators record GDP growth rates significantly higher than the Latin American average.

It is worth mentioning one aspect that would clearly be missed in this analysis because it is almost impossible to measure. Although it is worth noting that it is clearly present as a backdrop in the GPI; it is part of the underlying system surrounding innovation, without which, in general, it would not occur. This is the case of the institutional and financial environment.

Closely related to available resources, they are at the very frontier of what is measurable. Intuitively, it seems impossible, not to say naive, to think of policies that encourage greater investment in R&D&I while ignoring the environment, but we all know that the same environment can be more or less favorable depending on random social characteristics, such as trust, social mobility, accumulated knowledge and experience, security, and civil cohesion. The greater or lesser presence of intermediary bodies between authorities and individuals clearly does not directly and automatically regulate innovative behavior.

It can also be concluded that genuine progress is more oriented toward sustainable development, which implies greater concern for the economic, environmental, and social impact of policy objectives. A policy aimed at promoting innovation at the regional, national, and supranational levels must be flexible, systemic, participatory, proactive, and cohesive. Just as innovation is identified as a factor conducive to sustainability, it is assumed that sustainability will also benefit from policies designed for this purpose.

From the foregoing, it can be concluded that the conjunction of the Genuine Progress Index with the Global Innovation Index is more than acceptable for forming the Economic Development Index construct.

Well-being Conversion Factor (WCF)

The Human Development Index (HDI) focuses on three dimensions: enjoying a long and healthy life, acquiring knowledge, and enjoying a decent standard of living. However, well-being also includes subjective aspects. To this end, the Happiness Index (HI) analyzes inequality and perceived poverty experienced by people to calculate perceived happiness.

Inequality and perceived poverty are generally positively valued, even for countries with high material development. It is understood as an improved scale of GDP and is developed through a subjective comparison of an individual's or country's situation with pre-established benchmarks. From a paternalistic perspective, that is, considering what is best for people, some indicator of subjective well-being should be included to assess whether the HDI is helping the population perceive that they are living a meaningful and

happy life, ensuring that material improvements have a positive effect on people's subjective well-being.

From a more democratic perspective, as proposed in the first pillar of human development, people strive to achieve happiness or well-being, and therefore, from a free trade perspective, some monetary indicator should be included that is affordable for all citizens.

In the field of human development, well-being has been gaining increasing relevance. The concepts of well-being and happiness are present in human thought, referring to two central aspects of human nature: material and physical well-being, and happiness, which is largely related to subjective satisfaction. All of these concepts mention that authentic happiness implies satisfaction in a broader sense than pleasurable sensations limited to a person and a given moment. In many cases, well-being is associated with agency, the quality of relationships, social cooperation, civic engagement, and social participation.

At the global and regional levels, in many cases, the current understanding of development and progress contradicts the concepts of well-being, happiness, solidarity, and good living.

The current paradigm of human development has given importance to quantitative indices such as measuring economic growth, the increase in monetary resources, and the satisfaction of short-term needs, sometimes neglecting human well-being in a comprehensive sense.

The HDI does not explore mechanisms by which these variables can determine each other. Given that the HDI is an indicator that quantifies a country's well-being across three dimensions (health, education, and quality of life), and is explicitly or implicitly present in virtually all measures of well-being, such as national happiness indices, it is important to observe how these two indicators relate.

For the HDI, an increase in one dimension has a positive impact on a country's well-being.

The happiness index, on the other hand, does not consider a breakdown by dimensions, so an increase in it positively impacts well-being.

Ultimately, both indices present a measure of well-being, the dimensions of which are not specified.

Currently, the study of human happiness and welfare economics are of interest to many researchers due to the concern with studying and reflecting on the level of well-being of people living within a society.

Globally, leaders, politicians, academics, and international organizations are interested in developing strategies to help people express their aspirations: Botello-Peñaloza (2021) notes, "If there is one issue that politicians, leaders, economists, and analysts are interested in, it is whether their strategy makes people more satisfied."

With the goal of comparing the level of well-being between different countries, human development has been measured in different ways throughout history. Since the Industrial Revolution, measurement has primarily been based on economic criteria to analyze the level of well-being in different countries. However, one approach that has emerged as the most widely used to measure this concept is that of the United Nations, which annually produces a report measuring various factors that are intended to be related to the well-being of the population of different countries.

This index, used to measure human development, is based on four variables: health, education, income, and life expectancy at birth.

The development of this index is especially important because it allows for better interpretation of other economic variables, and the greater the dimensions of human capital, the greater the development.

In the field of statistics and social policy, various authors define happiness. Among these multiple definitions, there is one that is fundamental: happiness as a synonym for subjective well-being. This implies that to measure happiness, one directly measures a person's perception of the quality of their own life, that is, satisfaction with different aspects of life, from the economic, social, emotional, or even spiritual.

This measurement chooses to consider happy people whose perceived quality of life is above the point at which they are related to a median life satisfaction on a continuum of satisfaction without a goal.

These people are often called "satisfied" or "happy." Subjective well-being scales are often used, including life satisfaction and the inverse relationship of life dissatisfaction, which works according to Raven's model.

As in other disciplines, economics scholars have also addressed the study of happiness. These studies have developed various interpretive models of the concept of happiness, although their purpose is not to establish a formal definition of the concept. From their perspective, authors have reached various conclusions that happiness is not proportional to increased consumption. Furthermore, the most significant parameter is the presence of friends; a strong institution like marriage is a highly influential factor in individual happiness; and too many weekly hours under work pressure diminish people's subjective well-being. An interesting conclusion confirms a significant decline in overall life satisfaction over the course of the Digital Age, as measured by declining happiness levels.

The reality of each country is not homogeneous. This means that different realities exist within the same country; therefore, a cross-sectional study could not capture the complete reality of a country. Each country in Latin America, to cite one example, lives in a parallel reality that, using quantitative methods, cannot be explored in the depth required to conduct research.

Comparing the indices in different geographic regions reveals interesting cases, such as Spain, which emerges as a place where achieving success does not lead to a substantial improvement in individuals perceived subjective well-being compared to neighboring countries. Thus, if we measure the temporal evolution of average levels of well-being in different regions of the world, we see regional differences. For example, we find that the perception of happiness has clearly declined in Europe since 2005. In contrast, among the countries of the Persian Gulf and Southeast Asia, there has been a sustained increase in subjective well-being since 2005. By dimension, we observe that health emerges as one of the variables most explanatory of well-being scores.

For this reason, if we compare the Human Development Index with the index of happiness or subjective well-being, the problems are enormous. Not only in relation to subjective well-being, but also with the Human Development Index itself. To begin with, the objective of development is to understand that the pursuit of citizens' subjective well-being or the promotion

of their happiness is a more legitimate and desirable goal than mere economic growth. Attempting to measure this effort with an indicator whose dimensions only consider economic issues reveals an immediate limitation. To date, there is no composite indicator that incorporates alternative elements of subjective well-being.

The theory suggests analyzing the two indices separately and as a continuous variable, studying, in the case of the Happiness Index, the correlation with other factors that influence it (such as, for example, gender, age, education, work activity, marital status, number of hours worked per week or leisure time) and, in the case of the Human Development Index, also analyzing the relationship with other factors that can influence human development (such as economic activity or health).

Perhaps the most notable finding, from an analytical perspective, of all the research conducted on the subject is that when analyzing the components of the HDI with the happiness scale, a virtual tie is found between health and income, healthcare and income care.

Combining both studies, the relationship between the HDI and happiness, has not proven to be negative; that is, a contradiction between them has not been presumed. On the contrary, the HDI is related to happiness. In turn, the relationship is direct, such that the greater the human development, the greater the happiness.

For this reason, the element of the formula proposed in the construct, and with the aim of analyzing both intrinsically related elements, it was considered that the conjunction of the HDI elements with the IF can provide a closer approximation to reality.

Undoubtedly, the results obtained are not the most reliable, but they provide an approximation of what is intended to be measured for the construction of the Economic Development Index. Deficiencies or non-inclusions in this conjunction are standardized and allow the results obtained to be adopted, thus validating the conjunction of HDI and IF.

GINI index

Poverty, as a watershed phenomenon in income distribution, imposes a barrier to development, and this is what justifies it as a specific economic problem. Under these conditions, the income acquired by each individual not only reflects the income corresponding to their individual efforts and the resources they choose to employ, but also confirms their status in the society to which they belong.

From this perspective, clear evidence emerges: there is a segment of society that suffers from a state of poverty at varying levels, while others could be called wealthy. This situation, in addition to reflecting a profound difference in their social makeup, can even be a barrier to their growth.

Developing countries comprise around 80% of the world's population, prompting reflection on the existence of poor distribution among their member countries. Some sociologists claim that, under current historical conditions, at least two-thirds of the population lives in poverty. But above all, because it shows a growing gap between rich and poor, hence the importance of analyzing the causes, its evolution, and measuring and evaluating its consequences.

The most objective data are provided by economic development indices; however, these go beyond the economic term and essentially translate as a trap, as they once again reflect the problem of poverty, which represents the other side of the coin in the development variables. In other words, it is necessary to determine a factor, which is clearly poverty.

To properly understand the role of poverty in the context of development, one of the first tasks would be to conceptualize the phenomenon of poverty, situating it as one of the defects or pathologies of the economic system or subsystem that are the result of the socialization of individuals and have been hidden from the most media-sensitive currents.

However, a general acceptance of these conclusions does not mean that they are unique, so it is necessary to begin by analyzing the different basic development models to explain their effects on poverty. The ten possible models in which development can affect poverty can be explained based on three basic development models: the modernization model, the structuralist model, and the peasant economy model. Based on these models, the image of

the development of advanced industrial capitalist economies and the development process followed by the different economic subsectors is developed, analyzing the effects of this development on poverty.

A person is considered poor when they do not meet the level of well-being necessary for their full development.

However, the diversity of ways of measuring poverty has led to a considerable proliferation of concepts. Indeed, the various ways of measuring poverty often serve as a pretext for countless theoretical discussions among economists, sometimes to the detriment of practical aspects, for which poverty measurement is more relevant. However, these discussions sometimes focus the debate on what ultimately matters: the effects of poverty on economic development.

Two approaches are proposed to defining poverty: absolute and relative. The first establishes a poverty line, below which people are considered poor, and is associated with the concept of basic needs. This poverty line is common to all individuals and countries and does not vary over time. The relative approach, on the other hand, means that what matters is the behavior of relative income, the living standards of individuals or groups relative to the means or living standards of others.

We can identify different types of poverty, for example, depending on their duration. They can be chronic poverty (permanent over time) or transient poverty (temporary over a period of time).

Chronic poverty must be overcome with increasingly effective long-term policies focused on the most important members of society, especially children under 12, so that they have opportunities and acquire habits and values at an early age.

On the other hand, transient poverty will require short-term actions, with immediate measures such as the allocation of specific resources.

Another type of poverty is material poverty, which involves not having enough to live in decent conditions. This is the poverty we often observe beyond our borders, in other less developed countries.

However, given that people need much more than food and shelter to live a full life, many researchers have expanded the concept, adding other relevant dimensions: the ability to choose, the freedom to build a life plan; social relationships, which include active participation in society; health, which goes beyond not being sick and being situated "in such a way that our quality of life can and will be reasonably good"; and intellectual, emotional, and social development, which increases with the achievements we make. Therefore, this broad definition of poverty includes reference to material poverty, but not only.

Poverty in a country or region is usually measured based on the self-reported income of individuals or households. The poverty threshold is defined by taking the poverty line as the minimum value necessary to satisfy a minimum desired consumption pattern, in accordance with a representative cultural standard.

Two methods are used in this calculation: Basic Needs Cost Method: The poverty line was calculated by assuming the cost of all food and non-food goods and services that covered minimum caloric and protein needs; an acceptable level of physiological and social well-being was established for a typical family, based on a dominant intellectual assumption. One problem with this method is that it overlooks or disregards the interrelationship that may exist between the different components of the level of well-being being measured.

Income Approach Method: Two techniques are available: the additive method, when the comparison is made with a single income, and the multiplicative method, when there are several incomes and it is assumed that over-compliance in one income may lead to under-compliance in another.

Similarly, it is possible to distinguish between three different situations depending on who decides the poverty threshold: a purely statistical matter at the technical level; A decision with a clear ideological charge, so that other institutions can use the thresholds resulting from this decision to make their poverty calculations comparable with those established; and a scientific one, with a clearly interpretive nature of the meaning of the phenomenon studied as a basis for those responsible for action to establish their priorities based on a specific social project.

Poverty reduces economic growth if resources for the development of individuals and their families are not considered. Thus, people without adequate

training and education, or whose training is paralyzed by a lack of opportunities for professional development, development, and consolidation, are forced to remain in poverty, lacking the necessary tools to develop their life plans and those of their children. Education is required to be able to work, or they must be very poor and work from the age of 5 or 6, or they must work illegally, with the understanding that until the age of 16, such activity is punishable by both the worker and their employer. They will barely earn an income below the poverty line, which will furthermore be reduced by the lack of future income opportunities due to their truncated careers.

The low productivity of a worker with little training will not ensure sufficient income to lead a solid and sustained life, so their family, if they receive state social integration benefits, would be living in poverty.

If the individual's previous education was not adequate and desired, if there were no problems with social, emotional, psychological, or physical adaptability, if there were no factors that caused functional diversity in the individuals in question... in short, if there were no obstacles to acquiring vocational training, we would be in the situation described in the previous paragraph. However, this does not consider social assistance received as income, which lifts people out of poverty, unless the individual's employment status results in a salary equal to or higher than the exclusion threshold. The case of Social Programs in Mexico is a clear example of this.

A growth in the number of poor people decreases the number of skilled workers, technologists, and scientists. Furthermore, these grow more slowly than would be normal because the savings factor logically decreases. This fact produces clear social inequality that further burdens the economy. The increase in the number of wealthy people who accumulate greater wealth is significantly less than the increase in the number of poor people.

Productivity losses are clearly due to what is known as a vicious cycle. The growth of productive factors, savings and human capital, is slowed. The savings rate drops considerably; people have less and less ability to save. For future investments and self-sufficiency, a lower level of income becomes increasingly essential, so it is not necessary to set aside as much money for the future.

The main factor driving productivity decline is increasingly underutilized resources. The excess of unemployed labor also leads to a lack of experience, a decline in efficiency and skills, a lack of qualified training, and a lack of initiative. We need to invest more and better, dedicate more time to training, to better education, and to better training. If we need to invest more and dedicate more time to improving our well-being, we are not going to do so by increasing our income.

Poverty tends to be hereditary, and although one can speak of certain predeterminations that are present in human nature, such as temperament or genetic constitution, the development of certain skills and academic preparation that are related to the very opportunities for growth and development throughout the history of human societies has been strictly linked to the economic conditions in which people are born and grow up.

Undoubtedly, these depend on their peers or immediate environment, but also, fundamentally, on the educational system they are part of. Education depends on the income of parents, and therefore, if they have a low level of education, they are at a disadvantage in meeting the family's basic needs and have little time to dedicate to their children.

There is a marked relationship between poverty and education, and this develops in the form of a vicious cycle: income deficits generate low educational attainment, and, in turn, lack of schooling constitutes one of the fundamental ways this poverty is transmitted to subsequent generations.

This cycle perpetuates two negative cycles: microeconomic, to the extent that poverty affects the family's quality of life, and macroeconomic, considering that one of the prerequisites for a country's economic growth and development is its average level of education.

Mexico's current educational gap prevents it from consolidating its economic base for growth and competitiveness in the face of the profound transformation the global economy is undergoing. Education is a determining factor linked to improving the economic environment, promoting employment, and fostering individual progress.

Poverty is a multi-causal phenomenon, and health suffers the consequences of poverty. On the one hand, there is a cycle between poor health

and the reproduction of poverty, as both factors act together, simultaneously affecting people's capabilities and opportunities.

Since low-income countries have economic barriers that make it difficult for people to access quality health services and prevention, the poorest residents of these countries can become seriously ill. As a result, some families become impoverished not only as a result of paying for health services, but also because one or more household members are unable to work due to illness, costly emergency medical care, chronic loss of productivity, or the possible premature death of a household member, which is detrimental to family income.

The bidirectional correlation between income and health clearly shows how poverty, as a direct cause of poor health, contributes to the vicious cycle that tends to perpetuate poverty and its associated characteristics in the human sphere.

In general, in the field of human and social development, there are three major currents of thought, among others, that explain and propose alternatives to poverty: classical economic theory, cultural anthropology theory, and Marxist theory.

The first current conceives of development in macroeconomic terms; poverty refers to an individual or social state in which people or groups lack the resources to meet their material needs or livelihoods.

The second current considers development primarily in terms of cultural traits, associating poverty with barbarism, premodernity, and destitution. More recently, this term has been restricted to situations of extreme disadvantage.

The third current, meanwhile, conceives of development as a social process that must ultimately guarantee the well-being of the entire population.

Poverty is affected by a series of individual, social, historical, situational, and structural factors. Individual factors include: low educational level; reduced ability to adapt to the environment; chronic health problems, addictions, and violence, along with precarious living conditions. Similarly, domestic factors such as being the child of a single parent, having illiterate children in the home, an excessive pursuit of comfort that fosters laziness; inadequate breakfast habits that border on unhealthiness, among others.

At the sociohistorical level, there is cultural discrimination and, sometimes, disregard for one's own rights; while at the structural level, inequality, which is brutal in some countries, affects other factors such as inflation, the inability to develop and manage science and technology, and limited investment in rural road construction, among others.

It is essential to clarify that poverty is not the same as credit poverty, consumer poverty, intellectual poverty, emotional poverty, sexual poverty, ecological poverty, spiritual poverty, leisure poverty, or patriarchal poverty, to name just a few.

Regarding the portion explained by different economic factors, the variable that appears to be most affected by the effects of poverty and that has the greatest explanatory power in the variation in GDP per capita is foreign trade.

This could be considered a high-caliber weapon among the tools for growth.

Along with openness, the allocation of resources in the economy is a fundamental element: as poverty decreases, profound changes will be required in factors that tend to be depleted, generally labor.

On the other hand, as wealth is generated from capital or specialized resources such as water, raw materials, energy sources, or patents and trademarks, there will be a tendency to reach an industrial location whose borders hinder a more rapid reduction in poverty.

Considering that natural resources tend to be depleted, it will not be easy to maintain the increase in a nation's wealth from that point on, and given that industrial locations tend to accumulate population, progressive relocation to areas with greater employment potential will be necessary.

According to Meza Aliaga (2022), one of the aspects that influences poverty more than others are the survival strategies of very poor families: they are "great devourers of natural resources; their intensive use is the starting point for the establishment of a productive activity." "Translated into effects on poverty, this means that its endemic nature or persistence will necessarily depend on two variables: family choices and the availability of socioeconomic surpluses... which, ultimately, destined to expand productive investment and generate employment for other family units, determine the desideratum"; that is,

recurring social problems such as poverty, unemployment or underemployment, malnutrition, and deteriorating health are the result of the individualistic logic imposed by the capitalist system and the inappropriate way in which domestic units and the productive sector in general are structured.

On the contrary, the Marxist model, by emphasizing the economic-hierarchical function of the family, also places it within the realm of conflict. What it proposes is that, precisely because of and as a result of the development of capitalism, ancient traditional methods of production are being replaced by more sophisticated ones of a capitalist nature. This implies a destruction of the old forms of production. This is precisely the perspective from which I assess the formation of the capitalist economy. Within rural, feudal societies, the family survives as an autarkic unit of production, as long as the social externality that disrupts the correspondence between private profits and social benefits does not arise.

I have said that poverty is not only a scarcity of resources, but also a structural problem, since it reproduces the material conditions of the group in question. Therefore, poverty will negatively affect the social environment in terms of overcrowding, lack of services, etc., and it will also affect cultural values by introducing so-called supernorms, that is, the sacrifice of long-term assets for the immediate acquisition of resources. In this context, poverty produces a set of consequences that lead us to speak not of a core, but of vicious cycles of social exclusion.

Poverty inhibits economic growth, social mobility, and human development. Regarding growth, a secure life impedes the accumulation of wealth; with low levels of investment, not enough wealth is created to ensure the dynamism of the economy; and the absence of a sizable and solvent market limits specialization and non-specialized sales, which hinders competition.

On the other hand, sustained growth cannot be conceived without social mobility.

Conflicts begin to emerge if substantial changes toward better living standards do not occur, triggering various structural manifestations, such as the non-incorporation of labor, its expulsion, the possibility of partial improvements between groups, or the delay of social advancement.

Finally, human development, according to the theorists of sectoral dualism and brain drain, only occurs with high levels of income and economic growth. This growth corresponds solely to the modern sector, excluding the majority of the population.

Poverty influences economic development; Or rather, poverty largely determines underdevelopment, since it undermines the economic structures of nations, which in turn affects the distribution of wealth and its production. This explains the "necessity" for poverty to exist.

The concentration of resources in a few hands hinders development. On the contrary, if money is circulating, it means business is doing well, causing unemployment to fall and, therefore, income to begin to increase. As society grows, it will seek other markets due to globalization. This is why it can be said that poverty destroys economies and, in turn, prevents large and medium-sized companies from expanding their industries to other destinations, but it is necessary because it drives development. It's like a paradox. It's not desirable, but necessary.

Poverty therefore represents the deprivation of opportunities for each person to enhance their skills and abilities, as well as increase their knowledge to be a productive entity and participate in social activities, which can directly affect a country's economic growth.

While this is true, it is very difficult for social equity to exist in a country, since a person will always need the work of another person or people, which is called specialization. It is not possible to expect economic equity among individuals, because each person is different, and therefore each person will acquire material possessions differently.

However, living in a country with a large number of unemployed people, most of whom are young, will always hinder the only factor that resource's function; therefore, they directly impact the country's economic development.

The attitudes of poor families can be key to understanding economic formations based on organized crime.

The presence of domestic violence is primarily associated with economic stress factors, when family expectations are not meeting expectations.

Social violence tends to increase due to urban unrest, armed groups with poor management of their structures, and struggles between gangs to control spaces.

The available evidence on the relationship between poverty and violence is scarce and contradictory, which is problematic in a context where violence is not only a phenomenon in the lives of individuals, families, and communities that deteriorates their quality of life, but also a variable of central importance in human development.

Typically, a country's policy has a set of specific objectives in different areas that, if directly associated with poverty problems, can contribute to combating it. Therefore, the preferred policy option for poverty implies that these objectives be critically and rigorously reevaluated. It does not necessarily follow from this that specific objectives or actions aimed solely at solving the problem of poverty can be identified. However, it does seem fair to suggest that we should reevaluate not only the objective itself, but also the effectiveness and social costs of the policies and mechanisms used, which ultimately fall primarily on the poor.

In general, we must distinguish two types of policies: targeted and non-targeted. What do we mean when we talk about targeted policies? Targeted policies are those that directly affect the poor. The clearest example is found in cash transfers, where many conditional cash transfer programs focus on transfers and targets for poor families, as is the case in Mexico. These are distinguished from non-specific policies, which benefit or harm the entire population or even a broader subgroup, but do not restore the specific properties of the objects of our study.

The story focuses on President Franklin Delano Roosevelt's New Deal program, which served to mitigate the effects of the Great Depression. The Great Depression is considered the worst economic crisis in the United States history of the last century, so the New Deal program was one of the benchmarks for virtually all social assistance programs implemented over the past seven decades, largely because it is considered to have helped mitigate the effects of the crisis.

It is widely accepted that poverty in the traditional sense of the term, that is, within the context of a lack of income, takes its toll on society. Howe-

ver, it seems less obvious that other phenomena empirically linked to poverty, such as nutrition and health problems—both special cases of deficient human capital—also have very significant effects on economic performance.

One of the essential challenges facing poverty elimination is the observed deficit in human capacity. If we have a high proportion of illiterate people, an undernourished population with health problems, inefficient management of higher education, and a uniquely deficient capacity, an aggravating factor and, at the same time, a direct consequence of these types of problems is the loss of productive human lives, true "human capital." The above-mentioned situation gives rise to multiple vicious circles: low investment in human capital contributes to maintaining poverty and underdevelopment, just as the low profitability of this investment contributes to the high accumulation of physical capital, with a high tax burden that further inhibits investment in both types of capital.

This topic has generated a very interesting political debate, which we must frame within the framework of local economic development. It is a topic of study in a compilation of experiences and lessons learned on local economic development in Latin American countries. The importance of local governments being responsible for implementing these measures is fundamental, because local governments are in a minority position in their environment. For example, many companies establish their headquarters or corporate offices in large cities and experience a disconcerting industrial deconcentration. Furthermore, well-informed and effectively monitored local transportation can generate comparative advantages within the overall framework of the economic system, because this is the competence of the transportation provision system of a small-scale market, which can have significant effects on local development.

Unlike GDP, life expectancy at birth, and the population's literacy rate, there are indicators that, due to their very nature, do not yield solely endogenous results. These indicators include the fertility rate, which can formally be interpreted as endogenous, but which always responds to current conditions beyond its own; there is also the Gini index, which summarizes inequality in a single measure but also reflects varying degrees of inequality in different areas. In the case of the fertility rate, a decline in this rate and a resulting aging of the population can be interpreted as indicators of improved living conditions

(greater well-being, access to health care, increases in quality of life resulting from technological advances that allow for longevity, etc.).

Reducing poverty is a challenge for the entire community and entails improving access to education, health care, adequate nutrition, basic sanitation services, and the opportunity to participate in society—that is, fulfilling the most basic rights. Continuing to enrich the rich while making the poor ever poorer is an unacceptable alternative. It is up to all of us to combat the throwaway culture that excludes people and their material possessions and to increase society's participation in decision-making until we form a truly indignant democracy that answers the question: Where are we going?

For all these reasons, poverty is subtracted from the other indicators when constructing the Economic Development Index formula at hand.

If the index increases over the medium term, it means that poverty reduction strategies are working and that income distribution is more equitable. However, if the index decreases over the medium term, it would mean that the country's economic policy is not taking action to reduce poverty, and consequently, income distribution is concentrated in the hands of a few, as is the case with the neoliberal economic model, which would ultimately lead to social conflict.

VI.

Data collection for applying the formula

1. Data collection

GDP

YEAR	INDEX
2015	2.7
2016	1.8
2017	1.9
2018	2.0
2019	-0.4
2020	-8.4
2021	6.0
2022	3.7
2023	3.2
2024*	1.2

Source: World Bank

GPI

YEAR	INDEX
2015	7.4
2016	6.7
2017	4.8
2018	6.8
2019	6.8
2020	6.9
2021	6.9
2022	6.6
2023	8.2
2024	7.9

Source: INEGI

GII

YEAR	INDEX
2015	3.8
2016	3.5
2017	3.6
2018	3.5
2019	3.6
2020	3.4
2021	3.5
2022	3.1
2023	3.1
2024	3.0

Source: OMPI

HDI

YEAR	INDEX
2015	7.7
2016	7.7
2017	7.8
2018	7.8
2019	7.8
2020	7.8
2021	7.6
2022	7.8
2023	7.8
2024	7.8

Source: INEGI

HAPPINESS INDEX	
YEAR	INDEX
2015	7.2
2016	6.8
2017	6.6
2018	6.5
2019	6.6
2020	6.5
2021	6.3
2022	6.1
2023	6.3
2024	6.7

Source: World Happiness Report

GINI	
YEAR	INDEX
2015	4.89
2016	4.69
2017	4.69
2018	4.60
2019	4.60
2020	4.46
2021	4.46
2022	4.35
2023	4.35
2024	3.74

Source: IMCO

WCF	
YEAR	INDEX
2015	7.44
2016	7.29
2017	7.17
2018	7.14
2019	7.20
2020	7.12
2021	6.94
2022	6.97
2023	7.06
2024	7.24

Source: Own elaborationt

ECF	
YEAR	INDEX
2015	5.60
2016	5.10
2017	4.20
2018	5.15
2019	5.20
2020	5.15
2021	5.20
2022	4.85
2023	5.65
2024	5.45

Source: Own elaboration

2. Graphical representation

1. Behavior of the variables studied in the research, relative to the Economic Development Index obtained.

	GDP	GPI	GII	HDI	HI	GINI	EDI
2015	2.7	7.4	3.8	7.7	7.2	4.89	10.85
2016	1.8	6.7	3.5	7.7	6.8	4.69	9.50
2017	1.9	4.8	3.6	7.8	6.6	4.69	8.58
2018	2.0	6.8	3.5	7.8	6.5	4.60	9.69

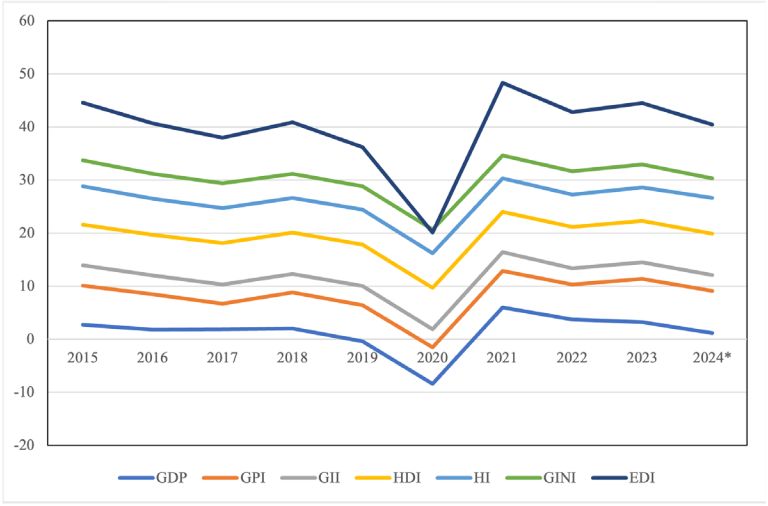
	GDP	GPI	GII	HDI	HI	GINI	EDI
2019	-0.4	6.8	3.6	7.8	6.6	4.60	7.40
2020	-8.4	6.9	3.4	7.8	6.5	4.46	-0.59
2021	6.0	6.9	3.5	7.6	6.3	4.46	13.68
2022	3.7	6.6	3.1	7.8	6.1	4.35	11.16
2023	3.2	8.2	3.1	7.8	6.3	4.35	11.56
2024*	1.2	7.9	3.0	7.8	6.7	3.74	10.15

Source: Own elaboration

Figure 1 suggests that it is understandable that the Economic Development Index reflects the same behavior as the Brito Gross Domestic Product Index, given its greater impact and because it is the fundamental basis for research.

Figure 1

Behavior of the variables in relation to the EDI



Source: Own elaboration

Meanwhile, the Genuine Progress, Global Innovation, Human Development, and Happiness indices exhibit similar behavior because they are not based solely on production, consumption, investment, and the trade balance. Rather, they reflect individual satisfaction with social well-being. This does not show much variability because it has not undergone major changes in

the last 10 years, except for the initiatives undertaken by the previous administration and the one currently being undertaken by the current government (2024–2030). If these initiatives continue, a higher index would be expected by the end of the six-year term, especially since the actions being taken aim at substantially reducing poverty.

2. Behavior of the IDE with the application of the construct proposal

	GDP	ECF	WCF	GINI	EDI
2015	2.7	5.60	7.44	4.89	10.85
2016	1.8	5.10	7.29	4.69	9.50
2017	1.9	4.20	7.17	4.69	8.58
2018	2.0	5.15	7.14	4.60	9.69
2019	-0.4	-0.4	5.20	4.60	7.40
2020	-8.4	5.15	7.12	4.46	-0.59
2021	6.0	5.20	6.94	4.46	13.68
2022	3.7	4.85	6.97	4.35	11.17
2023	3.2	5.65	7.06	4.35	11.56
2024*	1.2	5.45	7.24	3.74	10.15

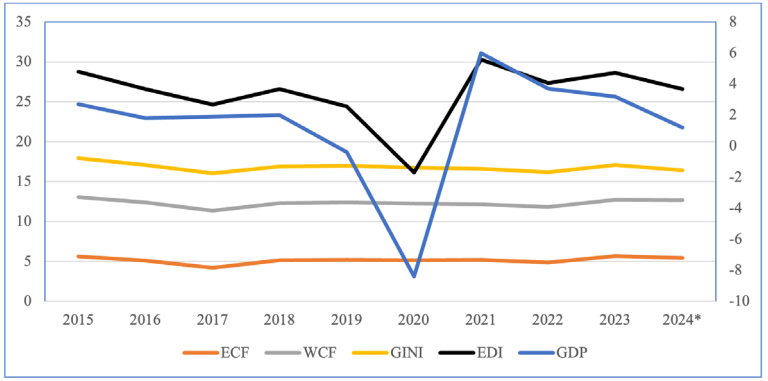
Source: Own elaboration

By applying the data obtained from the different indices to the formula for constructing the economic development index for the period 2015-2024, Figure 2 is obtained, which demonstrates the significant influence that the Gross Domestic Product exerts on the Economic Development Indicator, as both reflect the same trend.

It is also observed that poverty has gradually decreased during this period since 2018, as a result of the domestic policy strategies implemented in the country. In fact, this is consistent with the decrease reported by the World Bank, and I quote: "The proportion of people living in poverty in 2024 will be 8.6 percentage points lower than that recorded in 2018, at the beginning of this administration, when it stood at 28.8 percent. This represents a significant drop compared to the peak reached in 2020, when it rose to 30.3 percent of the total."

Figure 2

Behavior of the EDI with the application of the construct proposal



Source: Own elaboration

Additionally, I emphasize that these reductions are primarily due to the series of social programs implemented by the previous and current governments.

Figure 2 also shows a series of events that occurred during the period analyzed, namely:

- A sharp decline from 2017 to 2018 is observed due to the change of government from Enrique Peña Nieto to Andrés Manuel López Obrador. This decline is repeated, albeit to a lesser extent, during 2024 when López Obrador takes over from Dr. Claudia Sheinbaum Pardo.

- The precipitous decline that occurred from 2018 to 2020 is also evident due to the COVID-19 pandemic, which paralyzed productive activities worldwide. However, thanks to the strategies adopted by the government to minimize its impact, accelerated growth is observed in 2021, which has subsequently stabilized to date (early 2025).

- The fundamental role of the country's domestic, foreign, and monetary policy is noteworthy; This has allowed for the maintenance of stability, not only economic but also political and social, as reflected in the Economic Development Index achieved after the period under analysis. That is, we have managed to move up the stratification scale of the EDI, having moved from a low level to an emerging medium level:

Stratum	Range (%)
I–Low	0 – 10
II–Medium	10–20
III–High	20–30

Or else:

Year	EDI	Stratum
2015	10.85	Medium
2016	9.50	Low
2017	8.58	Low
2018	9.69	Low
2019	7.40	Low
2020	-0.59	Low
2021	13.68	Medium
2022	11.17	Medium
2023	11.56	Medium
2024*	10.15*	Medium*

Source: Own elaboration. *Estimated data according to information sources

- In the specific case of the Economic Conversion Factors and Well-being, it is noteworthy that the former did not undergo significant changes, as the same strategy of rescuing the population and incorporating it into the country's political activity has been maintained and continued over the last seven years; while the well-being factor shows a slight increase, as a larger portion of the population has benefited from social programs, especially with the change of the new administration.

- Additionally, the graph allows us to visualize areas of opportunity to increase production, incorporating the well-being of the population and, at the same time, reducing poverty.

3. Behavior of the ECF with respect to its component variables: GPI and GII

YEAR	ECF	GPI	GII
2015	5.60	7.4	3.8
2016	5.10	6.7	3.5
2017	4.20	4.8	3.6
2018	5.15	6.8	3.5
2019	5.20	6.8	3.6
2020	5.15	6.9	3.4
2021	5.20	6.9	3.5
2022	4.85	6.6	3.1
2023	5.65	8.2	3.1
2024	5.45	7.9	3.0

Source: Own elaboration

Figure 3 shows that both GPI and GII indicators are closely related. The GPI stands out because it considers aspects such as the environment, governance, and society in its formulation, independently of the economy.

For its part, the Global Innovation Index during the period under analysis was hindered by the Bucareli Treaty, signed by the governments of Mexico and the United States on August 23, 1923, during the administration of Álvaro Obregón.

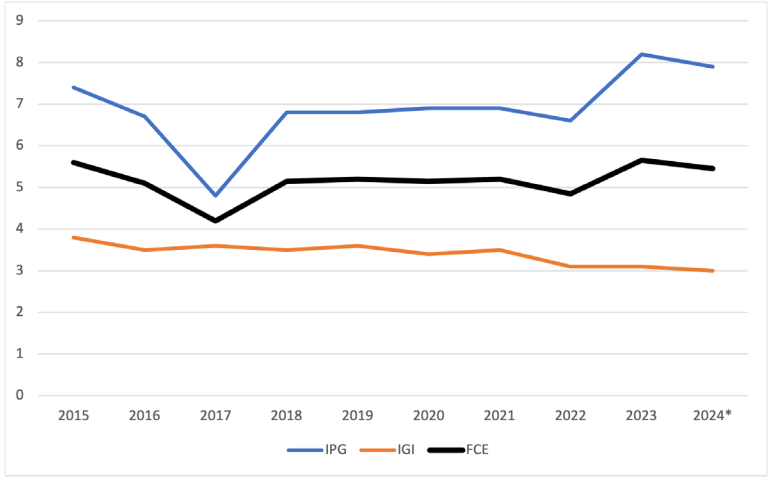
This Treaty, among other things, such as granting excessive rights and privileges to foreigners (including the guarantee of unlimited property rights), prevented Mexico from developing its own technology in all areas, particularly in the military, and committed to using only technology generated in its northern neighbor.

This has resulted in our country lagging approximately 25 years behind China in terms of technology adoption; and in terms of overall development, it is estimated to be 75 to 100 years behind, especially in the development of its own technology and its direct application in society.

However, this situation has changed and is currently receiving a strong boost with the creation of the Secretariat of Science, Humanities, Technology, and Innovation and the refusal to ratify the Treaty for another 100 years.

Figure 3

Behavior of the GPI and GII variables with respect to the ECF



Source: Own elaboration

Ultimately, this will be the turning point for the launch and takeoff of the Economic Conversion Factor, which in the medium term will substantially improve and accelerate the reduction of poverty, thereby moving from the incipient stratum II to the stratum III or High in the Economic Development Index, as previously stated.

4. Behavior of the WCF with respect to its component variables: HDI and Happiness Index

	WCF	HDI	HAPPINESS INDEX
2015	7.44	7.7	7.2
2016	7.29	7.7	6.8
2017	7.17	7.8	6.6
2018	7.14	7.8	6.5
2019	7.20	7.8	6.6
2020	7.12	7.8	6.5
2021	6.94	7.6	6.3
2022	6.97	7.8	6.1

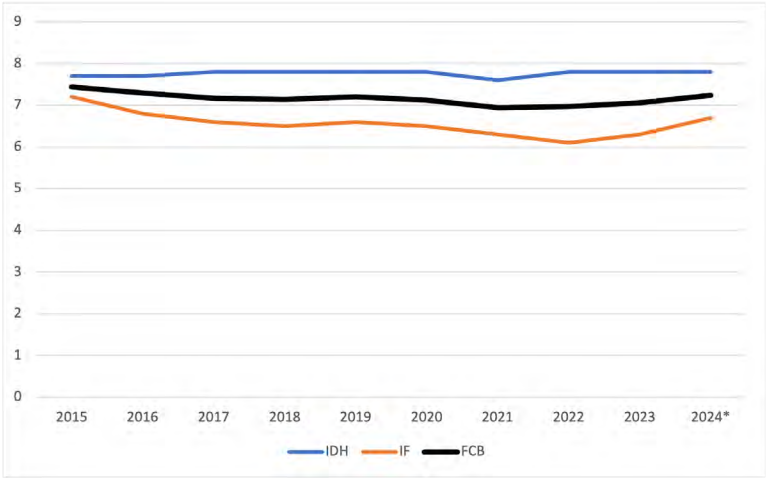
	WCF	HDI	HAPPINESS INDEX
2023	7.06	7.8	6.3
2024	7.24	7.8	6.7

Source: Own elaboration

Significant links between human development and human well-being can be found in the behavior of the variables, understanding that within this framework, development will contribute to human happiness (Figure 4).

Figure 4

Behavior of the DHI and Happiness Index variables with respect to the WCF



Source: Own elaboration

Empirical trends have shown that, on average, the countries in the world with the highest levels of human well-being are those that have shown the greatest progress in human development, specifically when they are based on a full and institutionalized democracy.

Data for the period 2015-2024 indicate that in Mexico there is a positive correlation between human development and well-being.

Some have argued, however, that these results reflect a case of reverse causality, claiming that it is well-being that induces human development, not

the other way around. In any case, the agreement between the two lines of argument demonstrates that the relationships between these variables, although different, tend to be mutually beneficial.

Research on happiness and human well-being has grown exponentially over the past three decades. The main contributions have been institutionalized within a human development approach. This development approach is different from the traditional approach because the latter measures development by its quantity, by its growth rate. Human development is measured by the well-being that countries achieve. This human development approach begins to focus on the institutions and public policies that facilitate this well-being, this good living.

Positive reciprocal correlations occur with sustainability efforts over time, which in turn will motivate recurring local actions to improve people's quality of life.

This is the case in our country, where practices aimed at improving human development have reflected growing happiness. Dr. Gerardo Leyva of the Research Institute for Development with Equity at the Universidad Iberoamericana explains that the recently published World Happiness Report 2025 places Mexico 10th among the happiest countries in the world, which may seem contradictory compared to its Gross Domestic Product and poverty levels. However, it is understandable if we conceptualize the current sociopolitical development with the change in the economic model.

3. Gaussian Bell Curve

Gaussian Bell Curve of Mexico's EDI. 2015–2024 Period

Year	GDP	ECF	WCF	GINI	IDE	IDE (GAUSS)	Distribution
2015	2.7	5.6	7.44	4.89	10.85	-0.59	0
2016	1.8	5.1	7.29	4.69	9.5	7.4	0.09
2017	1.9	4.2	7.17	4.69	8.58	8.58	0.1
2018	2	5.15	7.14	4.6	9.69	9.5	0.1
2019	-0.4	5.2	7.2	4.6	7.4	9.69	0.1
2020	-8.4	5.15	7.12	4.46	-0.59	10.15	0.1
2021	6	5.2	6.94	4.46	13.68	10.85	0.09
2022	3.7	4.85	6.97	4.36	11.16	11.16	0.09

Year	GDP	ECF	WCF	GINI	IDE	IDE (GAUSS)	Distribution
2023	3.2	5.65	7.06	4.35	11.56	11.56	0.09
2024*	1.2	5.45	7.24	3.74	10.15	13.08	0.05

Mean	9.2
Variance	14.77
Standard Deviation	3.84

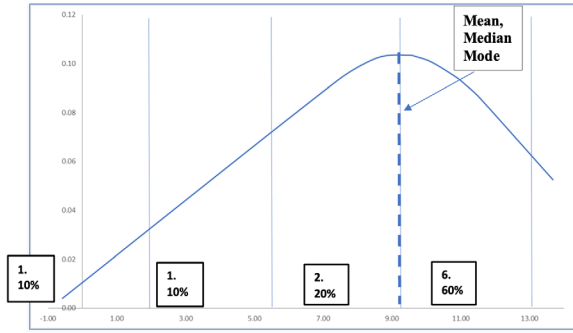
Gaussian Bell Distribution		
1.51	1	10%
5.36	0	0%
9.2	2	20%
13.04	6	60%
16.88	1	10%

Source: Own elaboration

The inflection points are found on the curve in Figure 5, where it changes from concave to convex or from convex to concave. At these points, when projected along the axis according to the data distribution, the distance between the value where the inflection point coincides and the mean is equal to the standard deviation.

Figure 5

Gaussian Bell Curve of Mexico's EDI. 2015–2024 Period



Source: Own elaboration

Thus, at the end of the curve, its extremes are asymptotic because there is always a data point that reaches one of the extreme values, as is the case with the data from the two years in which the COVID-19 pandemic occurred (2019/2020).

It is also known that when the curve is delimited by the inflection points and a range is adopted where the mean is measured and the standard deviation is delimited, the area that is delimited in the curve is equivalent to 68% of it and when the range is extended to two standard deviations the area of the curve that is included in that range is approximately 95%, and when it is done to three standard associations, 99.7% of the curve is completely covered by that range. In the case at hand, all the rest of the data are located in the entire data of the remaining period.

This information is useful in many areas, since it can determine inference issues and the probabilities of Type I errors, but it could also have a more pragmatic use.

This methodology, in addition to graphing all the indicators proposed and outlined in the formula designed to obtain the Economic Development Index, allows for the identification of variables that need to be modified to achieve a closer relationship with the means and standard deviations of each of them. It also allows for the comparison and positioning of the political-economic strategies of countries with the same economic models or systems.

The data found at the inflection point to the left of the mean (20%) correspond to changes in government where there is a decline in the Economic Development Index. This is because the activities of the outgoing government are combined with those of the incoming one. This process, within the framework of the 2024 handover of government, is not as pronounced because the political strategy of the incoming government is similar to that of the previous one. This is an indication that the established economic policy is yielding results and could propel the country toward sustained economic development.

VII.

Final considerations for the application of the EDI Construct

A series of questions arise from the proposed construct, such as:

¿What is the purpose of economic development?

¿Why should we pay attention to certain factors that directly impact the Economic Development Index, such as: improved training and data collection; technological development; entrepreneurship; the needs of society in all its aspects; or the country's domestic and foreign policy?

¿Why should we pay attention to the Environmental Footprint Index; the Demographic Aging Index; and, more recently, the development and use of artificial intelligence?

1. Economic development

Economic development has been the subject of study and debate over the past few decades, reflecting an evolution in theoretical and practical approaches that seek to address the complexity of this phenomenon.

In his analysis, Mora Toscano (2006) presents a review of economic development theories, focusing on the postulates of dependency theory and a critique of neoclassical approaches. This article highlights the importance of understanding underdevelopment in the context of Latin America, where the limitations of previous theories have led to the search for new perspectives that integrate not only economic growth but also social and environmental factors.

Aguado Odina et al. (2008) expand this discussion by introducing the concept of Sustainable Human Development, which emphasizes the need to meet human needs while respecting the environment. Their historical analysis reveals that, although theories of economic growth have dominated economic

thought, they have failed to adequately address the disparity between rich and poor countries. Criticism of the failure of development models to consider sustainability and social equity becomes a recurring theme that challenges traditional notions of growth.

Within this framework, Phélan and Perdomo (2023) question the effectiveness of conventional economic indicators, such as GDP, in measuring people's true well-being. His argument highlights the need to adopt a more multidimensional approach that includes social and environmental indicators, suggesting that economic growth alone does not guarantee an improvement in the quality of life. This approach aligns with the broader criticism of models that fail to consider the equitable distribution of resources and social well-being.

Finally, Iturralde Durán (2019) synthesizes these ideas by addressing the evolution of development paradigms, suggesting that the objective of economic development should be the eradication of poverty and the promotion of a sustainable and peaceful environment. This article highlights the need for a multidisciplinary approach that integrates economic, social, and environmental aspects, recognizing that unlimited growth can compromise the sustainability and well-being of future generations.

This review demonstrates that the purpose of economic development transcends the mere accumulation of wealth and entails a commitment to social justice, equity, and environmental sustainability, posing new challenges and opportunities for the formulation of effective development policies.

Economic development has evolved from an approach focused on quantitative growth to a model that integrates social and environmental dimensions. The literature review reveals that the purpose of economic development is not limited to the accumulation of wealth but entails a commitment to social justice, equity, and environmental sustainability.

Mora Toscano (2006) presents an analysis of development theories, highlighting the need for a theoretical framework that considers the specificities of underdevelopment in Latin America, which entails a shift in the way we understand economic and social dynamics.

This approach is complemented by the work of Aguado Odina et al. (2008), who introduced the concept of Sustainable Human Development, em-

phasizing that development should focus on improving individual capabilities and meeting fundamental needs, rather than simply seeking economic growth.

Phélan and Perdomo (2023) criticize the reliance on conventional economic indicators such as GDP, arguing that they do not adequately reflect social well-being. His analysis highlights the need to adopt a multidimensional approach that considers resource distribution and quality of life.

Iturralde Durán (2019) reinforces this perspective by pointing out that the evolution of development paradigms has led to a more holistic approach that integrates social and environmental aspects, challenging the idea that economic growth alone can solve problems of poverty and inequality.

The literature reviewed indicates that economic development must be understood as a complex process that seeks to eradicate poverty and promote a sustainable and equitable environment. This multidisciplinary approach is essential to address contemporary challenges and formulate effective policies that truly improve people's quality of life and respect the environment.

A common question gives rise to social, economic, and political reflections: What is the purpose of economic development?

The answer to this descriptive question requires an initial analysis based on its objectives and nature, which is not simple.

Economic development is multidisciplinary, transdisciplinary, and involves various actors. The problem arises when disagreements arise regarding this issue; the answer entails a reflection that transcends the field of economic development.

Certainly, there are several relatively consolidated approaches regarding state reform, structural transformation or change, and human development. This raises delicate reflections regarding what the development model will be or what should truly be fostered in order to become a country that maintains healthy and sustainable economic development.

Some consider reducing poverty to be the central objective, while others consider it to be dignified through access to opportunities. The reason lies in the causes of poverty; some believe the primary reason is the lack of economic resources, which defines this group as more radical, tending to

view intervention for economic development as mere capital accumulation, a tangible and easily resolved issue.

The liberal view of development would focus on fostering increased economic opportunities until—through market forces—poverty tends to disappear. A more focused position would focus on providing opportunities in such a way that the most disadvantaged or excluded groups can take advantage of them while continuing to invest in the broader community.

For developing countries, real per capita consumption can be interpreted as a general indicator of human development.

The increase or decrease of a variable depends on its performance in economic activity, based on each individual's capital, the assets they possess, and the labor they generate. According to the definition presented here, economic development is a substantial transformation (increase or decrease) of resources based on rates involving aspects among which difficulties arise and which are subsequently transformed into production (product). This sustainability can be broken down into factors that, in turn, intervene in the broader concept of the philosophy of capitalism.

The objectives of economic development focus primarily on improving the well-being of the population in terms of increasing access to the set of basic goods necessary to raise the average living standards of families and each of their members. In this context, it is not difficult to observe that economic development seeks to improve material well-being, directly associated with the growth of economic activity and the percentage change in national income.

For this reason, economic growth is continually associated in economic literature in such a profound way that the different contributions made by economic activity are due to the different increases generated in the allocation of physical capital by each of the different sectors and industries that appear. The activity of the different industries themselves generates their contribution to GDP in terms of the production levels they achieve. Thus, the increase in income achieved by an economy, known as economic growth, is associated with increased production, which implies an increase in labor and the efficiency levels of all the physical factors involved in the production process.

2. Poverty reduction

Poverty reduction is considered one of the primary objectives of economic development within a capitalist system.

Poverty has multiple dimensions, making it impossible to identify a single poverty rate. Consequently, poverty is commonly defined multidimensionally or as absolute poverty, which measures the amount required to cover basic food and non-food needs.

In contrast, relative poverty posits that poverty is not observed in society.

Among the latter, various variants suggest income as an indicator for establishing the poverty line, that is, excluding from the group of individuals or families living in poverty those whose situation has changed. Thus, income can be considered either as derived from work or property, or as derived from products at the level of an inherited generation. In many cases, the levels of income percentages would be comparable to indicators of well-being or social status.

The overall well-being of certain functions can be characterized simply by evaluating certain types of income, capital investments, equipment with certain technologies, access to and frequency of healthcare and education, and coverage or indirectly, in terms of the possibility of participating in certain markets.

Let's reconsider the doubts in such a case, unless we focus on the possibilities of satisfying and shifting within the dimensions included in the sum of prices. The variations in the previous dimensions correspond to the complementarities or alternatives between dimensions that occur within them, and in turn, they are generated by actions.

It is precisely in these that certain determinants come together, occur, and are weighed, which are explicitly evaluated at the factor or relationship level, and indirectly resolved in a unique way, along with which actions have been taken. But in themselves, there are quite a few related interactions.

Improving the population's quality of life is, along with poverty reduction, one of the objectives of economic development that appears in most

works in this field. In this sense, two terms are typically used to refer to this objective: quality of life and well-being.

Economic development ultimately refers to the well-being of the population or individuals, such that any economic development strategy must contribute, directly or indirectly, to improving the well-being of the population.

Like quality of life, the terms used to refer to well-being are very varied. In addition to well-being, reference is made to the joy of living, happiness, satisfaction, convenience, the satisfaction of general and individual needs, convenience, and other variables that can be grouped into one of these three: quality of life, well-being, and human development.

While QD (quantity demanded) measures improvements in three dimensions of quality of life (primarily access to services and infrastructure, security against the country's historical risks, and satisfaction of the population's demands), and while the meaning of well-being does not necessarily imply less emphasis than poverty, we must not overlook the fact that all these individual conceptual intentions are not mutually exclusive. These are analytical categories that facilitate the analysis of a particular dimension, even if they are related to each other in reality or in their potential effect on the actual well-being of the group analyzed.

The 2030 Agenda and its 17 Sustainable Development Goals (SDGs) present challenges of ambitious dimensions. In this regard, SDG 12 (Responsible Consumption and Production) establishes a mandate to globally reduce waste generation by one-third and triple agricultural, food, and fiber production within a framework of environmental sustainability. SDG 15 (Life on Land) requires ensuring the conservation and recovery of ecosystems by 2030, according to region, nature, and culture. These estimates require SDGs 2 (Zero Hunger); 3 (Good Health and Well-being); 6 (Clean Water and Sanitation); 9 (Industry, Innovation, and Infrastructure); 11 (Sustainable Cities and Communities); 15 (Life on Land); No. 16 (Peace, Justice and Strong Institutions); and No. 17 (Partnerships for the Goals).

In this regard, it is also necessary to adhere to the Conclusions of the Conference on the Sustainability of the World Agricultural Model, which expressly affirm that the sustainable development of global agriculture must be based on the commitment of governments and institutions of international and

governmental organizations to promote reasonable development frameworks at all levels (national, regional, and international), drawing on the experience contributed by their national communities in sustainable agricultural practices. Finally, the conclusions address the important role that non-governmental and civil society organizations must play in ensuring the sustainable development of the world's rural communities.

The differences in economic development throughout history and today are attributable to multiple factors, the most relevant of which are listed below:

Natural resources are an integral part of a country's economic structure. They can include both agricultural and mineral production, as well as other raw materials used for industry.

Various factors are considered, which are divided into two types. On the one hand, there are factors that the economy does not control, the so-called exogenous factors of economic development, including natural resources and geographic location. On the other hand, there are factors that the economy has under its control and can be used to generate greater profits, which we will call endogenous factors. However, although there are factors it cannot control, the economy does have access to them and, more importantly, has the opportunity to use them to its advantage to generate greater profits and grow. This will be achieved if it effectively manages the resources provided by nature.

This includes both renewable and non-renewable natural resources, the most well-known and traditional of which are land, water, oil, coal, minerals, etc. Land is a scarce and non-renewable resource par excellence, since as it becomes the property of individuals, the control that owners have over the creation of new land is limited. In the case of water, it also allows the economy to store and circulate a resource that, as population increases, becomes increasingly scarce relative to available resources.

The most immediate problem for nations that depend on certain natural resources is that their income directly depends on international price dynamics. This dependence is all the greater the more limited the portion of a country's productive structure that is affected by these dynamics.

For its part, human capital constitutes one of the most relevant determinants of both the volume and quality of a country's income. It is estimated

that up to 75% of the differences in GDP per capita can be explained by human capital. In turn, the strength of institutions is based on the volume of human capital existing in the country.

Human capital is one of the most important and essential characteristics of a developing country. It is considered one of the characteristics that most directly affects a country's economic and social development. This is derived from various factors, such as the work capacity and skills of individuals in the economy. One of the most efficient ways to achieve social and economic development is through the education of individuals. An educated population generates significant benefits for a country's social and political peace, gender equality, environmental protection, and institutional support. A healthy lifestyle and personal and emotional growth are also key factors for the population.

Human capital is made up of a set of human qualities, such as emotions, feelings, reasoning, and everything that all these things bring with them, as well as everything that is often not tangible. The improvement of education, the loss of the limits only provided by schools, through the internet and other means that provide access to all people in one way or another, whether it be their own computer, a cell phone, tablets, etc. This is why it is becoming easier every day for people to gain greater knowledge on various topics and to overcome many limitations that previously existed in the physical world. While there is no certainty about the development they will achieve, since they often draw on assumptions that are not fully developed, new strategies for development are being developed through the internet.

Since the beginning of time, economic development has depended on an appropriate institutional framework that allows for the implementation of effective policies that support this goal. This institutional framework includes elements such as the rule of law, the defense of private property, the level of bureaucracy of the National Government, the limitation of corruption, account management, the support and management of central banks, the reasonable management of monetary reserves, as well as the regulators of the financial system, among others.

The elements listed above are part of institutions, understood as "the rules of the game of a society." This has taken on greater importance because the production of wealth and the proper use of this resource currently depend

on the economic development of each country. That is, not due to a gift from Mother Nature, such as a mineral or hydrocarbon deposit, but to the ability of certain countries to create favorable conditions for obtaining wealth, which comes primarily from the productive capacity of the workforce as well as through the technology employed.

Institutions play a preponderant role in the decision-making function of both the state apparatus and, in general, in the decisions taken by the various forms of private capital. In other words, in developed countries, unlike those with poor development, compliance with the rules is exemplary and abundant. In fact, non-corruption is more important than the development of active individuals through respect for institutions and, in turn, for each of the orders, as can be seen in the case of governments that have been divided for very long periods. In economic matters, development is attractive for storing wealth, knowing that the government's performance will not be optimal; therefore, they will believe that the wealth is safekeeping.

Technology is another factor that affects economic development, but like human capital or institutions, it can be conceived as an intermediate good required to produce other goods. Like any good, it can be improved, and often in more than one country, it is advantageous for already acquired knowledge to be transferred to other nations that lack the technology to acquire it more easily. This movement occurs at the personal level, through so-called "traveling experts" who, for a salary from a "rich" country, or through the academic communities of different nations, transfer knowledge. This is also related to the fact that much capital is now invested in "new" countries due to the role of technology, which tends to slow down as the economy grows, because greater human capital development allows for the absorption of greater amounts of knowledge and technology.

Therefore, if a country fosters technological innovation by establishing economic plans that encourage it and threatening companies with the loss of tax benefits if they don't innovate, it could run the risk of wasting energy designing policies that often fail to translate into innovation. However, if the country never encourages the development of innovative organizations, it will soon become locked into a purely exploratory development, with descriptive

and definitive data prevailing over the use of technology to understand the circulatory processes, structures, and behaviors of companies.

Economic development, understood as an evolutionary and time-bound process in which a social community becomes aware of its freedom to decide freely and, through harmony with others, the meaning it wishes to give to the process itself and to the challenges it must face, must include the organization of economic policy to achieve the promise of semantically clear public policies that seek social justice and generate the necessary conditions, through the organization of economic policy, for the arrival of new resources, movements, and projects of great economic, social, and environmental value. The transformation that any environment must undertake is guided by technological change, the quality of education, the quality of institutions, the existence or absence of territorial markets, the infrastructure of health systems, respect for local culture, and the free flow of capital.

Globalization refers to a process of growing interrelationship between human rights, local environments, nations, and types of economies. As the world became socially and culturally integrated and intertwined, an inter-territorial system emerged where economic relations were organized through productive, social, and environmental enclaves, which were determined by certain social advantages through significant value in their costs and products. Within globalization, there were no significant transformations in the concentration of wealth in developed countries. Industrial, agricultural, and service production shifted to developing countries, contributing to the increase in the following commodities of reference for political-economic processes in major nations in exchange for less costly access to their resources and a significant devaluation of local products.

Globalization has allowed the economies of almost the entire world to integrate into a single international economic environment, like a global market. Trade has grown at an unprecedented rate, except for the brief period between the two World Wars. In fact, almost all business decisions are motivated, in one way or another, by events taking place in other countries. If two economies in the world had a ban on foreign trade transactions, we would better understand the behavior of their companies. However, a globalizing era, such as the one we are experiencing, cannot be understood in this way.

Developing Asian countries have gone from being the "poor countries" of the time, or at least those with the lowest growth, to being among the leading groups in global growth. A vicious circle, with a hint of virtuousness, shows how surpluses have a positive effect on investment. The investments and trade volumes that the State increases then have a positive effect on productivity, since by understanding how the international economy works, the country can better utilize the resources of its own economic space.

Since the beginning of globalization, the wealth of European and North American countries has increased more rapidly than that of other countries. This has led to and continues to create inequalities between countries and has created what is known as the lock-in effect for other countries, which, instead of breaking with their colonial past through emancipation, have remained and continue to be oppressed by one-person or one-party tyrannies that exploit and repress their fellow citizens, as well as foreigners who can become troublesome and unwelcome competitors.

On the other hand, inequalities also exist within these same countries. In this sense, it seems that this globalization is causing the highest incomes to become concentrated in fewer and fewer people. Thus, between 1980 and 2013, the wealth of the richest one percent of American citizens increased from 33% to 39.1%. This is due to the fact that labor productivity increased by 172.8%, while the average real wage increased by only 5%, indicating that the wealth they produce is distributed very unequally. Similarly, the wealth of the richest one percent of countries, expressed in accumulated wealth, increased from 44.5% to 50.1%, due to the negative effect of maintaining these inequalities in this context of emerging countries.

To implement economic models that seek development in a country, it is important to develop policies that impact the local economy. This fosters growth and development. The policies implemented can be of different types, adapting to the characteristics of each case. Fiscal policies relate to the financial resources the state can obtain to finance development. Monetary policies focus on the use of money and credit to enable people to acquire and consume both basic and luxury goods and services. Finally, infrastructure policies are important for creating all the necessary and appropriate infrastructure so that the state can provide basic services and supply sufficient resources.

Economic development policies are implemented according to the characteristics of the country or region where an economic model seeking development is to be developed and implemented. This must be a complex and multidisciplinary study, as it does not correspond solely to a single discipline but also receives guidance from other disciplines such as sociology, geography, civil engineering, architecture, medicine, agronomy, and several others. And it is considered objectively and analytically to study the implementation and launch of a public policy that seeks economic growth and social development.

Monetary policies express the regulation of the monetary supply and its fluctuations (money in circulation, deposits of various types held by the public, etc.) and, therefore, the impact of this amount on the growth of national economies.

Fiscal policies are the actions controlled by the government to obtain the necessary resources to achieve its goals within this economic development. Fiscal policy must consider technical economic aspects through its instruments of taxes, fees, contributions, retirement or pension income, and exchange bonds. The government can regulate economic growth through a system of community, basic, and comprehensive transfers to reduce gross income for reconversion into public spending.

Fiscal policies are a form of economic planning because they allow the national business system to relate to the external environment. At the same time, they control the separation of those revenues and expenses as payment for external financing, provided by other investors belonging to other independent economies, such as international organizations, or directly from international banks. In turn, it is necessary to establish consumption patterns that each administration should monitor and inform the public about.

Infrastructure is associated with favorable conditions for economic development and the identification of social and private benefits and costs, which characterize definable infrastructure projects in cost-benefit models or profitability assessments. All of this, in general, is outside the scope of territorial economic analyses, which confuse the availability of favorable transportation conditions for economic activity.

The presence of infrastructure—public or private—always has an intrinsic positive effect associated with transportation conditions—in terms

of social costs or timely transportation to markets, with competitiveness for the country. If a country's economy is not liberalized despite the presence of favorable infrastructure conditions, it is also not in a position to demonstrate competitiveness with favorable insertion in international markets.

Economic development implies the growth of national economic activity and the resulting increase in income. On the other hand, I define human development as the increase in human capabilities that entails improving living conditions, constitutes a democratic phenomenon, and represents a sustained, long-term transformation process. From these definitions, the existence of a relationship of interdependence between the two is clear: economic development is a necessary, though not sufficient, condition for human development.

However, achieving this economic development from the perspective of economic theory and putting it into practice through economic policy is not simple. Not only must the reality of each country be taken into account, but there are also major problems that affect all. The most notable are economic crises, climate change, and social inequalities.

In this context, it is appropriate to ask: How can economic development be achieved when a country suffers a crisis or natural disaster? How many development plans in different countries have been left behind with the arrival of the pandemic? Of course, the solution lies in first monitoring the situation in these countries and making the appropriate and necessary modifications to the economic policies applied.

The 2020 crisis caused by the COVID-19 pandemic has once again made clear the complexity of human development, although it may seem obvious. This pandemic has affected all countries, obviously with different effects that depend, among many other causes, on each country's public system. However, all of them have had to delay their human development plans for several months. Climate change, even more so, because while a crisis can end it overnight, climate change cannot, as it gradually affects people's well-being.

Climate change is at the forefront of global economic and sustainable development. It has recently been recognized that climate change is a natural phenomenon that can be accelerated, differentiated, and influenced by the actions and decisions of societies.

Climate change is understood as the change in climate directly or indirectly attributable to human activity that alters the composition of the global atmosphere and is added to natural climate variability over comparable periods of time.

This phenomenon can influence river flow and evapotranspiration processes, for example. It can alter some parameters of agricultural production (by decreasing soil fertility or available water, altering the relative initial conditions that determine desired and/or lost yields, for example). It can increase ambient humidity and the pressure of meteorological systems (more water can lead to more rain, storms, hurricanes, or more calamities caused by the poor condition of these systems) and has caused phenomena that are difficult to study, such as the emergence of new vectors of human diseases, the appearance of tsunamis, or irreversible melting of glaciers, which have caused a whole series of new calamities.

Accompanying the important achievement of the first and most immediate Sustainable Development Goals and their fulfillment for the entire world, the international community seeks to continue putting aside several key issues to ease tensions in the international order.

The first group of these issues includes climate change and the resulting goal, which calls for tripling the cost of adaptation to it. Adaptation costs have been estimated at various orders of magnitude, subject to changes due to an increase in phenomena and additional revenue, estimating them at $120 trillion. Furthermore, there are the challenges of compliance with international adoption agreements and the analysis of shipbuilding, with the operation of computerized risk portfolios in the Americas, which do not adjust vulnerability for variations.

Social inequality can be defined as the disadvantage that certain groups or individuals suffer compared to others; that is, their ability to satisfy their life needs, both basic and others related to the full development of their capabilities, is less than that of other groups within the same society.

The phenomenon of social inequality has more serious effects than the simple difference or material distance between sectors or individuals, because it suggests that their capacity for action is diminished or undermined by the actions of others. This is particularly evident in contexts where social groups

seem "invisible" to the rest of society; many of their members are left out of decision-making that would benefit other sectors or even other individuals in their community, but who have been "postponed" due to their absence.

Social inequality manifests itself in various areas such as politics, economics, social welfare, education, and health. In general terms, and particularly in the case of Latin America and the Caribbean, the entire economic literature has documented ad nauseam that economic growth alone has failed to distribute the existing wealth in society and that inequality between individuals grows as their economies become more dynamic and prosperous. For example, the ten richest people in Latin America concentrate more than 50% of the region's economic wealth. In some economies of a global scale and more obscene impact, such as the United States, the situation is similar, where a couple of men were able, on their own, to benefit from 25% of the nation's wealth, which, moreover, they believed was normal in a capitalist country.

Economic development consists of several processes occurring simultaneously. The cause that changes these conditions is perhaps the fundamental phenomenon on which the economist focuses his attention, but the processes to be triggered are many and varied. The interaction of these various elements tends to present an aspect that is conceived as the objective: economic development. However, it is a local economic development, which has sometimes been mistaken for the main objective of its efforts.

The mainstream of economic development, neoclassical theory, focuses on the growth rate; marginalist political economy focuses on distribution; and political economy primarily focuses on the interest rate and, therefore, on capital ownership.

In logic, one can assume, with the restrictions that the theory assumes, simulations, the growth rate, a series of parameters, differential interest rates in the economies in which it operates and on how many properties the other economy has, and observing other properties of the system, one obtains the conclusion, according to said mode of reasoning, that the level of economic development or its growth rate does not matter, what matters is its composition.

3. Environmental footprint and demographic aging

The intersection between the environmental footprint and demographic aging in economic development has been the subject of study in various research projects, which have addressed the complexity of these issues from different perspectives.

In 2000, Sánchez Vera highlighted the need for complementarity between sociology and economics in the study of aging, emphasizing that this synergy must focus on the everyday and family sphere. Through his analysis, he establishes that demographic aging not only affects the economic perspective but also requires a broader understanding that includes non-monetary dimensions (Sánchez Vera, 2000).

Going back in time, Sánchez González explored the socio-spatial inequalities of aging, noting that factors such as migration and the characteristics of the physical and social environment significantly influence the quality of life of older adults. This study suggests that aging can generate economic benefits for communities, implying a critical consideration of how development policies can be integrated with the realities of aging in place (Sánchez González, 2014).

More recently, in 2016, T. Minoldo (2016) addressed the sustainability of aging, highlighting the economic implications arising from an increase in the older population. Her research suggests that aging can place a burden on welfare and social security systems, potentially compromising economic growth. The author argues that assessing the economic consequences of aging is essential to ensure the sustainability of these systems (T. Minoldo, 2016).

Finally, Gisele Mazzetti Latini and Soledad Crissi Aloranti, in 2018, "examined aging from a territorial perspective, challenging the productivism view often associated with old age in capitalist societies. Their work emphasizes the importance of promoting autonomy and equity, as well as fostering intergenerational relationships to enhance community development. This approach suggests that a more inclusive understanding of aging can contribute to building human capital in old age and reducing vulnerabilities."

These studies show that the relationship between the environmental footprint and demographic aging is complex and multifaceted, requiring critical consideration and an integrative approach to economic development.

The article "Sociology of Old Age Versus Economics of Old Age" by Pedro Sánchez Vera (2000) offers a critical perspective on the interrelationship between sociology and economics in the context of demographic aging. The work underscores the need for complementarity between these two approaches to effectively address the challenges posed by population aging. In particular, the author emphasizes that, although economics has dominated the analysis of old age, it is essential to also consider sociological dimensions to fully understand the behavior of older adults.

One of the key points of the article is the critique of the predominance of macroeconomic studies, which, while valuable, often neglect the micro-economic level. The latter is where the economic decisions and behaviors of older individuals truly manifest themselves.

Sánchez Vera argues that it is in the everyday, private, and family spheres that interactions between monetary and non-monetary economics should be sought, as this can enrich the understanding of the economics of old age.

The author also points out that methodological development in economics can provide significant benefits when addressing sociological issues. This implies that economic research should not only focus on numbers and statistics, but should include a qualitative analysis that considers the experiences and needs of older adults in their daily lives. This approach can facilitate the identification of more effective policies that not only address economic needs but also improve the quality of life of older adults.

The article "Geographies of Aging: Social Processes and Spatial Inequality of Population Aging" by Diego Sánchez González (2014) offers an in-depth reflection on the intersection between demographic aging and the socio-spatial factors that influence this phenomenon. Through a detailed analysis, the author argues that population aging is not only a challenge but can also be an opportunity for the economic development of communities, especially those that become retirement destinations.

One of the key points highlighted in the article is the role of migration in the aging process. The decision of older adults to move to locations that offer a favorable physical and social environment can have significant implications for the local economy. This phenomenon of retiree migration can stimulate job growth and increase consumption, which, in turn, boosts the economy of these regions (Sánchez González, 2014). However, the author also points out that this dynamic is not uniform and that spatial inequality in aging is influenced by multiple social factors and specific contexts.

The article also addresses the importance of environmental factors in the quality of life of older adults. The characteristics of the place, which include aspects of environmental comfort and economic conditions, are crucial in determining whether individuals can remain in their homes as they age. This suggests that economic development should consider not only job creation but also the improvement of living conditions in communities that host an aging population (Sánchez González, 2014).

However, the author criticizes the lack of a focus on environmental gerontology, which could enrich the discussion on how the physical environment affects older adults. This omission is relevant, as a deeper understanding of how environmental factors interact with aging could lead to more effective policies that address both the environmental footprint and the needs of a growing population.

The article "The Sustainability of Aging" by T. Minoldo (2016) addresses a critical aspect at the intersection of demographic aging and economic development, underscoring the need to consider the environmental footprint in this context. T. Minoldo highlights that population aging poses significant challenges for social security, health, and welfare systems, given that a growing number of older citizens generates demands that could prove unsustainable for working cohorts (T. Minoldo, 2016).

One of the central points of the article is the burden that aging places on productive groups. As the proportion of older people increases relative to working-age adults, additional pressure is placed on contributors, which could lead to a reduction in economic well-being. This dynamic is worrying, given that economic well-being is threatened not only by the increasing dependency

of the older population but also by the decline in labor income per consumer, which negatively impacts economic growth (T. Minoldo, 2016).

Furthermore, T. Minoldo argues that aging and declining fertility are interrelated with the decline in gross domestic product (GDP). This aspect highlights the importance of assessing how demographic trends influence the economy, suggesting that a comprehensive approach that considers both aging and the environmental footprint is essential to understanding the long-term implications for economic development (T. Minoldo, 2016).

The article also suggests that assessing the economic impact of aging should include an evaluation of the demographic dependency ratio in old age. This approach provides a basis for understanding how public policies can be adapted to mitigate the negative effects of aging on the economy, while also considering environmental sustainability. In this sense, integrating the environmental footprint into the analysis of demographic aging could offer a more holistic perspective on how to address the upcoming economic and social challenges (T. Minoldo, 2016).

The article entitled "Population aging as a component of territorial ordering in the province of Córdoba, Argentina" by Mazzetti Latini and Crissi Aloranti (2018) offers a critical perspective on demographic aging and its relationship with economic and territorial development. The author argues that, in capitalist societies, the perception of old age is intrinsically linked to productivity, implying a social construct that devalues the "unproductive side" of older adults. This productivist approach, according to the article, must be challenged, as it is not only limited to the economy but also affects the quality of life and dignity of the elderly.

One of the most notable points in the article is the need to relativize this perception of old age, which implies a paradigm shift in how aging is addressed in the social and economic context. Mazzetti Latini and Crissi Aloranti emphasize that aging is influenced by genetic, social, and historical factors, suggesting that public policies must be multidimensional and adapted to local realities.

Furthermore, the article underscores the importance of providing adequate information that fosters self-worth and personal autonomy among older adults. This is crucial for redefining older adults' life plans, enabling

them to actively participate in society. Creating a socioeconomic and political environment that promotes equity is essential for preventing risks and reducing the vulnerability of this population.

Analyzing the needs of the aging population is another key aspect mentioned. Identifying these needs not only benefits older adults but also has implications for society as a whole, as aging is a phenomenon that affects all age groups.

Fostering intergenerational relationships in local communities is presented as an effective strategy for developing endogenous capacities and strengthening human capital in old age.

In conclusion, the literature review reveals that the relationship between environmental footprint and demographic aging on economic development is a complex issue that has been addressed from diverse perspectives. Over time, studies have emphasized the need to integrate economic and sociological approaches to fully understand the impact of aging on society and the economy.

Pedro Sánchez Vera's work underscores the importance of considering both the monetary and non-monetary dimensions of aging, suggesting that analysis should go beyond macroeconomic figures and focus on the everyday experiences of older adults (Sánchez Vera, 2000).

This establishes a framework for understanding how the decisions and behaviors of older individuals can influence economic development.

Diego Sánchez González adds a layer of complexity by addressing the socio-spatial inequalities affecting the aging population. His research shows that aging can be seen as an opportunity for economic development, especially in communities that attract retirees, but also highlights the need to consider how environmental and social conditions impact the quality of life of older adults (Sánchez González, 2014).

T. Minoldo focuses on the sustainability of aging, suggesting that the increase in the older population can put welfare and social security systems at risk, which in turn can compromise economic growth. The author argues that it is crucial to assess the economic consequences of aging in the context of the environmental footprint, emphasizing the interrelationship between these two dynamics (T. Minoldo, 2016).

Finally, Mazzetti Latini and Crissi Aloranti challenge the productivism view of aging, proposing an approach that promotes autonomy and equity. Their work suggests that a more inclusive understanding of aging can contribute to strengthening human capital in old age, which is essential for community development and vulnerability reduction (Mazzetti Latini & Crissi Aloranti, 2018).

Most of the literature reviewed highlights the need for an integrative approach that considers both the environmental footprint and demographic aging in economic development. The studies emphasize that aging should not only be viewed as a challenge, but also as an opportunity to promote policies that improve the quality of life of older adults and strengthen the social and economic fabric. The interrelationship between these factors suggests that considering the environmental footprint is essential to effectively address the challenges posed by aging in the context of economic development.

For many "young" countries, there is an opportunity to integrate more robust strategies into their planning to prevent the effects of both indicators; for many others, it becomes a challenge to achieve and maintain balanced and sustainable economic development.

4. Artificial intelligence

How would artificial intelligence affect economic development?

Artificial intelligence (AI) has emerged as a central theme in the analysis of contemporary economic development, generating significant academic debate about its implications for the labor market and productivity.

In this regard, Antonio Luis Terrones Rodríguez (2018) highlights how robots, by operating at speeds faster than humans, threaten the stability of routine jobs. Growing automation, while potentially offering benefits in terms of efficiency, raises serious questions about the future of work and the need for interinstitutional dialogue regarding its implementation in various sectors.

Along the same lines, Fernández-Macías et al. (2018) propose a multidisciplinary approach to assess the impact of AI's autonomy and generality on the future of work. The integration of human skills and capabilities of AI systems becomes crucial to understanding how automation will transform the

work environment. This analysis suggests that workers' adaptation to new task dynamics will be critical to mitigating the adverse effects of AI on employment.

Hernández Aragón & Destinobles (2019), address the duality of AI, emphasizing both its potential to increase productivity and the ethical and social challenges that arise from its implementation. The consensus on the positive impact on economic growth contrasts with concerns about inequality and short-term job losses, underscoring the need for policies that address these issues.

The work of Abrardi et al. (2019) complements this discussion by pointing out that AI could reduce the demand for human labor, similar to how machines have done in the past. The possibility of a radical abundance economy raises challenges regarding wealth redistribution and workforce training, highlighting the importance of concerted action to address emerging inequalities.

Research reveals that most managers view AI and the internet as tools to improve productivity and customer satisfaction. However, the changing nature of jobs will require significant adaptation of workers' skills, raising questions about the workforce's preparedness for these changes.

Piteira et al. (2019) identify the ethical issues that arise from the use of intelligent systems, suggesting that the integration of AI into everyday life must be carefully considered. Automated decisions in critical sectors such as banking and education pose risks of discrimination and bias, highlighting the need to establish clear ethical principles.

The systematic analysis by Nelson et al. (2023) of AI applications in manufacturing suggests that while AI can improve the efficiency and adaptability of firms, it could also exacerbate cyber vulnerability. The social implications of AI are complex and can both advance and undermine economic equity, requiring careful attention to its effects on society.

Finally, Andersson Lipcsey (2023) argues that AI adoption could have a significant impact on the GDP of advanced economies, suggesting that the integration of AI into international trade will be crucial for their development. The rapid adoption of emerging technologies indicates that we could be on the verge of a profound economic transformation.

The study by Prieto-Gutiérrez et al. (2023) concludes that AI is changing the structure of social science research, evidencing an increase in AI-related

academic output. This surge in research highlights the need to address the ethical and liability challenges that accompany the integration of AI across diverse sectors, suggesting that while AI presents significant opportunities, it also requires robust regulation and ethical approaches for its successful implementation.

The article "Artificial Intelligence and the Ethics of Responsibility" by Antonio Luis Terrones Rodríguez (2018) offers a critical perspective on the impact of artificial intelligence (AI) and robotics on economic development, focusing on the automation of tasks and its repercussions on the labor market.

Terrones Rodríguez points out that robots are able to perform tasks faster than humans, making them an attractive option for companies. This phenomenon is evidenced by the notable 16% increase in robot sales in 2016, according to a report by the International Federation of Robotics.

This growth raises questions about the stability of routine jobs, as automation could displace workers in sectors where tasks are repetitive and easily programmable.

The discussion on the implications of AI in the workplace is diverse. On the one hand, some experts see automation as an opportunity to increase efficiency and productivity, which could translate into economic growth. On the other hand, there is legitimate concern about job displacement and the potential creation of a wider economic divide, where the benefits of automation are not distributed equitably.

The author emphasizes the need for dialogue between public and private institutions to address the implications of AI in each professional sector. This recommendation is crucial, as the development of appropriate policies could mitigate the negative effects of automation, such as job losses, and foster an environment where AI is used to complement human skills rather than replace them.

The article "A multidisciplinary task-based perspective for evaluating the impact of AI autonomy and generality on the future of work" by Fernández-Macías et al. (2018) offers an in-depth exploration of how artificial intelligence (AI) can influence economic development through its impact on work and the capabilities required for both humans and AI systems.

The authors argue that, to understand task dynamics in the workplace, it is essential to examine the autonomy and generality of AI systems. This perspective is crucial, as autonomy refers to an AI system's ability to operate independently, while generality relates to the system's ability to apply knowledge in different contexts. The interaction of these two dimensions can determine the extent to which AI can automate specific tasks, which in turn has significant implications for the workforce and the economy as a whole.

The multidisciplinary approach proposed by the authors allows for the integration of diverse perspectives on work and automation. This is relevant because economic development depends not only on the technology itself, but also on how skills and capabilities are reconfigured in the labor market. As AI takes over tasks previously performed by humans, new skill demands are likely to emerge, potentially leading to a change in the structure of employment and the economy as a whole.

However, the article also raises significant challenges. The transition to a more automated work environment could generate inequalities if training and education policies are not properly managed. A lack of preparedness of the workforce to adapt to these new demands could result in rising unemployment or labor market polarization, where some workers benefit from automation while others are left behind.

The article "Companies, Technical Progress, and Employment. Analysis of Artificial Intelligence, Automation, and Job Creation and Destruction: The Participation of Human Capital and High Human Capital" by Hernández Aragón and Destinobles (2019) presents a comprehensive analysis of the implications of artificial intelligence (AI) on economic development, particularly with regard to employment and productivity.

The authors emphasize that AI focuses on two main areas: the understanding of human intelligence and the creation of "silicon brains." This duality allows us to understand that AI is not simply a product, but a set of solutions that integrate various techniques and programs. This opens a debate on the ethical, social, and economic consequences of its implementation in the workplace. One of the central questions raised by the article is the future of "biological brains" in a context of increasing automation.

From an economic perspective, the authors indicate that although AI implementation may have a negative impact on employment in the short term, the effect is expected to be positive in the long term. This analysis suggests that AI could lead to an increase in productivity and, consequently, economic growth. However, it is crucial to consider how this transformation will affect income inequality, as automation could exacerbate existing disparities if labor transitions are not properly managed.

The article also mentions the importance of human capital in this process. The participation of human capital and high human capital is essential to maximize the benefits of AI. This implies that, as automation and AI are integrated into the production of goods and services, a more skilled and adaptable workforce will be required. Education and continuing training become key factors to mitigate the negative impact on employment and ensure that workers can benefit from the new opportunities that arise with technology.

The article "The Economics of Artificial Intelligence: A Survey" by Abrardi et al. (2019) offers a comprehensive overview of the impact that artificial intelligence will have on economic development, focusing on the implications for employment and social well-being. The main idea developed is that, just as mechanical muscles reduced the demand for human labor, AI "mechanical minds" could do the same to human cognitive abilities. However, the article emphasizes that the extent and nature of this impact are still under debate.

One of the article's most significant contributions is the introduction of the concept of "economic singularity," which refers to a state of radical abundance in which economic growth is unlimited and human labor could potentially become obsolete. This scenario poses crucial challenges for policymakers, who must focus on wealth distribution and the elimination of market imperfections. The need to redistribute wealth and train people for new tasks becomes a central issue, especially in a context where AI could replace humans in routine and repetitive jobs, exacerbating problems of inequality and unemployment.

Furthermore, the article addresses the impact of AI not only on the macroeconomic level but also on the microeconomic level. The study discusses the effects that AI will have on market mechanisms and consumer decision-making

processes. AI's ability to make consumer choices more accessible and efficient is highlighted, although it also warns about the potential negative effects that may arise with the widespread adoption of these technologies.

The article "Artificial Intelligence and the Internet of Things: Study and Current Status in Businesses and Consumers" by Elisa Pilar Villalonga Gutiérrez (2019) provides a comprehensive overview of how artificial intelligence (AI) and the Internet of Things (IoT) are shaping the business landscape and their potential impact on economic development.

One of the study's most notable findings is that 98% of the executives surveyed consider innovation in these fields crucial for improving productivity and better understanding customers. This perception suggests that the adoption of advanced technologies is not just seen as a trend, but as a strategic necessity for business competitiveness. AI and IoT have the potential to transform operational processes, allowing machines to perform tasks more efficiently, which, in turn, frees up employees to focus on activities that require human skills, such as creativity and problem-solving.

The article also notes that 73% of executives believe it is essential to continue research in this area to maximize profits. This highlights the importance of investment in research and development, not only for improving products and services, but also for adapting to a rapidly changing labor market. AI could facilitate a deeper analysis of consumer preferences, allowing companies to offer personalized solutions and more effective loyalty strategies.

However, the study also raises a critical point regarding the transformation of the labor market. Although the implementation of intelligent machines could lead to the elimination of certain jobs, the article suggests that the total number of jobs will not decrease significantly, but rather will change in nature. This implies that while there will be challenges in reconfiguring employment, opportunities will also open up in areas that require specific skills that only humans can offer.

The article "Ethics of Artificial Intelligence: Challenges" by Piteira et al. (2019) addresses the growing relevance of artificial intelligence (AI) in various sectors of society and its potential impact on economic development. The work highlights the need to consider ethical issues in the integration of AI

into daily life, which is critical to understanding its influence on decision-making within organizations.

One of the key points of the article is the identification of guiding principles of ethics in intelligent and autonomous systems. This is essential, as the implementation of AI in sectors such as banking and automotive can radically transform the dynamics of these industries. For example, the use of machine learning algorithms can optimize processes and improve efficiency, but it also raises serious ethical challenges, such as the possibility of racial discrimination in mortgage-related decisions. This aspect is crucial for assessing how AI could affect economic development, as fairness in decisions can influence consumer confidence and, consequently, economic growth.

The article also includes a bibliometric study highlighting the main clusters of issues related to ethics and AI. This analysis is valuable for identifying trends and areas that require attention in the development of policies and regulations that guide the implementation of AI. The lack of a clear ethical framework could hinder AI's potential to positively contribute to economic development by generating mistrust among users and affecting the adoption of innovative technologies.

The article titled "Applications and Societal Implications of Artificial Intelligence in Manufacturing: A Systematic Review" by Nelson, Biddle and Shapira (2023) offers a comprehensive analysis of how artificial intelligence (AI) can influence the manufacturing sector, particularly small and medium-sized enterprises (SMEs). The authors emphasize that the implementation of AI applications could significantly transform the way these companies seek financing and contracts, which in turn could have repercussions for large-scale economic development.

One of the central points of the article is the ability of large language models to automate significant components of the programming process for machine control and automated management. This automation could not only increase operational efficiency but also improve firms' adaptive capacity, their awareness and responsiveness to customer needs, as well as their efficiency in resource use. These changes are critical for competitiveness and economic growth, as total factor productivity could increase at the societal level.

However, the article also highlights important concerns related to vulnerability to cyberattacks, given that reliance on AI systems could expose companies to significant cybersecurity risks. This aspect is crucial, as the security of data and technological infrastructure becomes increasingly relevant in today's digital economy. Furthermore, the authors warn about the possibility that AI could both promote and undermine economic equity, environmental health, national or global security, and political solidarity.

The article also mentions that AI could facilitate the reconfiguration of supply chains in response to disruptions, which could be a key factor for economic resilience. It also suggests that AI could improve firms' ability to understand and respond to customer preferences, which could lead to more inclusive and market-responsive economic development.

Andersson Lipcsey's (2023) article, "The Transformative Effects of AI on International Economics," offers an in-depth analysis of the impact of artificial intelligence (AI) on economic development, particularly in the context of advanced and developing economies. The central idea of the article is that AI adoption could increase the GDP of advanced economies by approximately 20% by 2030, while in less advanced economies this increase might not exceed 10%. This difference highlights a major concern about the economic inequality that could arise as AI becomes integrated into global economic systems.

Andersson Lipcsey mentions Leontiev's paradox, which suggests that countries with a higher capital-to-worker ratio may experience a lower capital-intensive share in their exports compared to their imports. This phenomenon is crucial for understanding how AI can alter trade patterns, as it could lead to more factor-intensive investments in certain sectors, which in turn could alter traditional trade dynamics. However, the author also notes that the implications for developing countries are uncertain, underscoring the need for further research on integrating AI into economic theory, particularly in the area of international trade.

The article highlights that sectors such as manufacturing and advanced technology will be most affected by AI adoption, which in turn will drive innovation in this field. This is significant since competitiveness in these sectors is closely linked to international trade. The interdependence between AI innovation and trade highlights the importance of policies that encourage

collaboration and exchange between nations, especially in a context where AI can be an engine of economic growth.

Finally, although AI adoption may be a gradual process, the author suggests that recent examples indicate that its integration could be faster than expected. This raises the possibility of 30% economic growth by 2100, which, if realized, could radically transform global economies. However, this projection also carries risks, especially if the inequalities that could arise between different countries and sectors are not addressed.

The article entitled "Artificial intelligence in social science: A study based on bibliometric analysis" by Prieto-Gutierrez et al. (2023) presents a bibliometric analysis that highlights the growing influence of artificial intelligence (AI) in various disciplines, including the social sciences. The research documents a notable increase in academic production on AI, with more than 19,408 articles published, 85% of which correspond to the period from 2008 to 2022. This growth suggests not only a growing academic interest, but also a significant relevance of AI in the social and economic spheres.

The authors identify subfields within the social sciences that are impacted by AI, such as law, education, economics, and ethics. This multidisciplinary approach is essential, as AI has the potential to transform not only the way research is conducted but also how policies are implemented and economic decisions are made. In particular, AI's impact on the economy can be profound, generating new opportunities for innovation and employment, as well as the need to adapt to an evolving work environment.

However, the article also points out the importance of addressing the ethical and liability challenges that arise with the implementation of AI. The authors argue that, to fully exploit the opportunities offered by AI, it is essential to establish appropriate regulations and address the ethical implications of its use. This aspect is crucial, as the lack of a regulatory framework could lead to negative consequences, such as the exacerbation of economic inequalities or the violation of rights.

In conclusion, artificial intelligence (AI) has become a determining factor in economic development, presenting both significant opportunities and challenges. The introduction establishes that automation, driven by AI,

can threaten job stability, especially in sectors where tasks are routine and repetitive (Terrones Rodríguez, 2018).

The speed and efficiency of robots compared to humans suggest a shift in labor dynamics that requires careful attention (Fernández-Macías et al., 2018).

A multidisciplinary approach is essential to assess how the autonomy and generality of AI affect the future of work, implying that adapting human skills will be key to mitigating adverse effects on employment (Hernández Aragón & Destinobles, 2019).

Throughout the review, there is a consensus on the potential of AI to increase productivity and economic growth, although concerns about inequality and short-term job losses are also highlighted (Abrardi et al., 2019).

AI could reduce the demand for human labor, similar to automation in the past, raising the need for policies that address wealth redistribution and workforce training. Furthermore, ethics in AI implementation is a recurring theme, as automated decisions can generate bias and discrimination, which could affect consumer trust and, consequently, economic growth (Piteira et al., 2019).

AI applications in manufacturing and other sectors are also discussed, highlighting both its ability to improve efficiency and cybersecurity risks (Nelson et al., 2023).

The integration of AI into international trade is presented as a crucial factor for economic development, suggesting that advanced economies could experience a significant increase in GDP thanks to the adoption of these technologies (Andersson Lipcsey, 2023). However, the inequality in the adoption and impact of AI across different economies poses a challenge that requires attention.

The boom in academic production on AI, especially in the social sciences, indicates a growing recognition of its importance in policymaking and economic decision-making (Prieto-Gutierrez et al., 2023). This growth highlights the need to address the ethical and accountability challenges associated with AI to maximize its benefits for economic development.

As a corollary, artificial intelligence presents a complex landscape for economic development, characterized by its dual benefits and challenges. The need for appropriate policies, workforce adaptation, and consideration of ethical principles are essential to ensure that AI implementation contributes to inclusive and sustainable growth, thereby impacting economic development.

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Author of the prologue

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Dr. Marco Antonio Zamora Antuñano is a professional with more than 30 years of experience in Education. He served as National Director of CIIDETEC-UVM (2021–2025) and Director of Research and Graduate Studies at the Technological University of San Juan del Río, in addition to serving as a research professor at various higher education institutions (2009–2017). He holds a PhD in Materials Engineering and Science (UASLP) and a PhD in Educational Sciences (IPEP). He has been an evaluator for the National Quality Award for more than 15 years, a member of the National System of Researchers (Level II), and has received awards such as the David Wilson International Award (2019), Best UVM Researcher (2020), and the FIMPES Research Award (2023). With more than 40 publications in indexed journals (JCR-Scopus), he stands out for his integration of academic management, knowledge generation, and professional training.

In the current economic landscape, the construction of a simple and reliable economic development indicator is necessary, as economic activity and growth have ceased to be mere changes in production volume and now involve multifaceted transformations within a nation's socioeconomic fabric. It is well known that increasing per capita income or accumulating more resources does not always guarantee greater development or well-being for acountry's individuals, and the economy serves as an indispensable instrument for improving the overallwell-being of society. The purpose of this text is to present a model of an economic development indicator that not only guides policy decisions but also serves as a practical tool for measuring the impact of development initiatives, allowing for the redirection of resources and efforts toward areas that require attention and improvement. By embracing the complexities of economic development and recognizing the various factors that contribute to social progress, we can forge a future in which growth is inclusive, sustainable, and beneficial for all.

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