Determinants of sustainable development An empirical study for countries of the Andean and Mercosur Regions in South America

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Introduction

Try to measure the development of a country from its sustainable point of view means not only the use of natural resources, but also health, education, labour, institutions, trade, investment, inflation, innovation, and more components related not just with increase the economic activity. As a result, some countries are not only considering GDP as their main goal; they are considering indicators like health life expectancy, school life expectancy, diversity of workforce, renewable energy regulation, transparency, innovation, etc. This approach to sustainable development is not something new, according with the Brundtland report "Our common future" sustainable development is which works in that needs of the present without limiting the ability of future generations to have access to them too. This concept involves dimensions like economic, social and environmental. The quality of population related concepts like employment, education, literacy, health, life expectancy, democracy, human rights, pollution, value of ecosystems, poverty, etc., are difficult to measure using quantitative tools.

Indicators that are more objective help a country to develop efficient policies that really impact in the quality of life of its citizens. Even if some not very responsible companies create specific

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human or social problems in the world, the 21 purposes or objectives for the future generations must be the connection between national growth and sustainability.

Therefore, this paper seeks to analyse whether there is a relationship between specific aspects in which both companies and the government can intervene to improve the conditions of a country and that, in parallel, contribute to the profile in terms of its sustainability. Specifically, if the ability to change the legal framework through policies, the possibility of innovation and the cooperation within a company is correlated with the sustainable profile of a country.

Overview and state of knowledge

Literature review - Hypotheses

The concepts of sustainability and economic growth have always been considered unrelated (Daly & Cobb, 1993). For the development of efficient policies, the business force can help to update the legislation and thus promote legal and economic development in parallel. Furthermore, for the change or transition towards a more "sustainable" or environmentally committed country, it is necessary for industry and government to work hand in hand. A technological, organizational, institutional, and social change is necessary to achieve sustainability, and this has to be more multidimensional, systemic, and disruptive (Ashford & Hall, 2011).

Dearing considers more than eco-efficiency initiatives; sustainable development requires continuous innovation. This aspect is important because sustainability is related to a step-change improvement in performance. Dearing (2000) states that "is not sufficient to meet the needs and aspirations of a growing world population with dignity". It is a continuous search for activities related to reducing negative impacts or enhancing positive influence on the environment while minimizing the use of natural resources (Jo *et al*., 2015).

Also, for the World Economic Forum (2019), the success of the environmental policy depends on both "forward-looking leadership vision and private sector awareness and choices" (p. 1). For this reason, if a country aims to achieve sustainability goals, it must go hand in hand with science, technology and innovation. These drivers are vital for sustained growth and prosperity.

The capacity to change "toward greater sustainability can be enhanced by appropriate legal and policy interventions" (Ashford & Hall, 2011, p. 271). Depending on what policies are chosen and applied in a specific market different effects can be obtained on the environment. If companies can impact the legal system and change the political conditions of a country in an integrated way with the state, it is much easier to develop social and economic instruments to achieve sustainable objectives. This possibility of change directed by the business sector was included in this analysis. So,

> H1: The Efficiency of legal framework in challenging regulations of the countries in the Andean Region in South America is positively related to sustainability.

The responsibility for investing in technology and development does not rest with the State. To make the business sector part of the solution on the road to a more sustainable world, the perspective around business must change. To achieve this, there must be a favourable environment for companies to see innovation as a source of added value for their processes. Another attribute of the use of innovation is that, as presented by the report of the Economic and Social Council (2017), It facilitates the transition in terms of costs and adaptation of families in each country. It also facilitates cooperation with other countries that develop innovations in parallel areas (The Experts Groups SDGs, 2015). For the purposes of this research, the definition provided by the Global Competitiveness Report against the variable "Capacity of innovation" was considered. According to the report, this variable measures *the capacity that companies have of innovating in a specific country* (World Economic Forum, 2011). So,

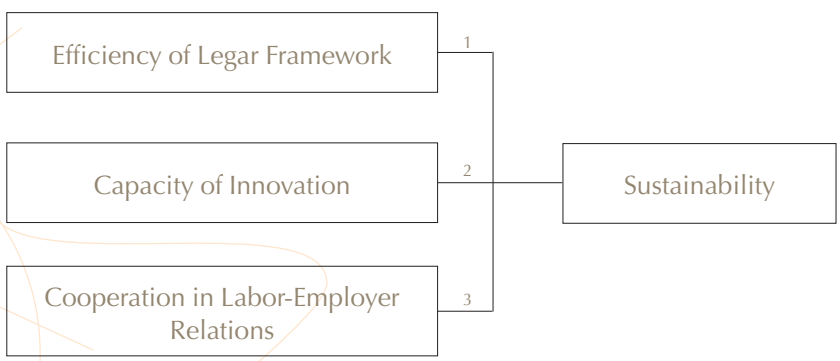
> H2: The Capacity of innovation of the countries of the Andean Region in South America is positively related to sustainability.

However, the role of innovation by itself does not achieve the expected effects, if there is no collaboration between companies to achieve greater impacts on society, even responding to more efficient and environmentally friendly policies. This joint work begins within the work environment of each of these companies. In the literature of this field author such as Walker and Touboulic (2015), Childs and Corney (2007), Volkery, Swanson, Jacob, Bregha, and László (2006) highlight the role of employees and the shared projects that are developed between them, to promote and carry out more effective sustainability strategies within companies that promote high levels of social and environmental responsibility. The variable of "cooperation in labor-employer relations" measures *characterization of the labor-employer relationship* (World Economic Forum, 2011), So,

> H3: The cooperation in labor-employer relations of the countries of the Andean Region in South America is positively related to sustainability.

Figure 1 shows the conceptual model that this research analyzes. In particular, the independent variables and the dependent variable, and the relationship between them.

Figure 1. Conceptual Model



The methodology of this research is presented below. In particular, aspects such as the units of analysis of the study, the measurements that were used of the variables, as well as the sources of information that were consulted to obtain that information and the statistical technique used to estimate the models and evaluate the hypotheses are detailed.

Overview / Data framing

The theoretical construct of Sustainable development begins with the consideration of the biological limits of the land and how these could be surpassed by economic interests. Authors began to criticize elements of the neoclassical school, which justified unlimited growth with the maintenance of natural resources. One of the areas that began to introduce the environmental variable into growth models was Environmental Economics (Moraleja *et al.*, 2009). Some renowned authors are Pigou, Hotelling and Coase. This trend was based on including environmental capital in growth measures as an economic factor that must last and to achieve this it is necessary to manage it holistically. The second approach was Ecological Economics, which is characterized by being more multidisciplinary. Authors like Holling and Georgescu-Roegen from different disciplines tried to justify the care that natural capital required and how it is not substitutable (2009).

The Rome Report on the Limits of growth represented a change for the perspective that was held on the ethical process of 'growth' in some developed countries. This first report proposes to choose alternative development models. The second report continued the call to care for natural resources and that unlimited growth was unlikely.

Subsequently, the publication of "the Brundtland report" or also recognized by its original title "our common future" contributed not only to provide a definition of sustainable development, but also to provide this concept consisting of 3 categories, the economic, ecological and Social (Brundtland, 1987).

Parallel to the concept of sustainable development, Human Development began to be considered in relation to satisfying basic needs, not just economic ones. The main defender of this new perspective was Amartya Sen (1999), he defends the concept of freedom and poverty reduction, because a person develops when he has more capabilities, not by consuming more goods. As a result of this new perspective, in 1990 Amartya Sen with Gustav Ranis and the support of the United Nations Development Program (UNDP, 1990), the Human Development Index emerged, which sought to give greater coverage to the measurement of human development.

The term Sustainable Development and the Growth of a country are not convergent. As proclaimed by The International Chamber of Commerce (ICC) Business Charter for Sustainable Development "Economic Growth provides the conditions in which protection of the environment can best be achieved, and environmental protection, in balance" (Moraleja *et al.*, 2009). For this reason, government intervention through policies and incentives can promote social health, economic activity and with it the global development of the country.

According to Schepelmann, Goossens, and Makippa (2009) after the Brundtland Report different approaches in relation to sustainable development have emerged over the years. The first highlights the interrelation of the basic dimensions. For the execution of sustainable effective programs, it is necessary to consider the 3 dimensions of sustainability: the environmental, the economic and the social. Institutions such as ECLAC became a fundamental part of evaluating "public policies, instruments and institutions, aimed at promoting a more inclusive economic activity with a lower environmental footprint in the countries of Latin America and the Caribbean" (Cepal & Naciones Unidas, 2019, p. 1). In 1948 this organization born to the purpose of "contributing to the economic development of Latin America" which reflects the positive relation that long-term sustainable initiatives have in the global competitive and attractiveness of a country, especially when the institutional environment is efficient enough to allow business sector growth (Schepelmann *et al*., 2009).

The second, in addition to the three-pillar approach, is the ecosystem health approach which states that "key property to be sustained is the capacity of ecosystems to respond with resilience to external perturbations and changes" (Schepelmann *et al*., 2009, p. 10). For this reason, it has two points of focus: the 'pressures' placed on ecosystems by human activities and the 'responses' of ecosystems to these pressures.

The third perspective is the resources or capital approach. This one is more related to per capita national wealth, conserve the stocks produces human social and natural resources, it is not only the idea of economics, because it integrates social, human and natural elements that were not thoroughly studied (Schepelmann *et al*., 2009).

The different proposals around the measurement of growth can be classified as: adjust and replace GDP. Those included in the first category are: Measure of Economic Welfare (MEW), the Index of Sustainable Economic Welfare (ISEW), Green GDP, etc. In the second one are: Human Development index (HDI), Genderrelated Development Index (GDI), Ecological Footprint (EF), Happy Planet Index (HPI), Environmental Sustainability Index (ESI), etc.

Methodology and data

Methodology

In the present study, the aim is to analyse whether there is a relationship between the variables: Efficiency of legal framework in challenging regulations, Cooperation in labor-employer relations and Capacity for innovation, with the results of the Andean countries and Mercosur members in the Sustainable Development Index.

For this reason, the Regression method will be used to identify the nature and degree of relationship between the variables.

Regression analysis is a reliable method of identifying which variables have an impact on a topic of interest (Hair *et al*., 2019). To carry out this analysis, it is necessary to choose a dependent

and an independent variable. Additionally, to conduct the method it is important to choose which variable will be the dependent, since this will be affected by changes in the others, the independent ones.

In this study this method is used to infer causal relationships between the independent and dependent variables. Where the Efficiency of legal framework in challenging regulations, Cooperation in labor-employer relations, and Capacity for innovation are the independent variables and the results of Sustainable development index (SDI) are the dependent variables.

Data Analysis

Units of analysis and statistical model

As mentioned throughout this document, the sustainable development approach has an impact on resources and the environment. For this reason, several countries have tried to foresee these effects. However, in the studies on the potential impact on the economy, they focus on countries that developed in the secondary and tertiary sectors of the economy.

Due to the fact that the study focuses on economies that depend much more on natural resources and raw materials, the data for the variables chosen were from the Andean countries (Colombia, Venezuela, Ecuador, Peru and Bolivia) and the members of the Mercosur treaty (Argentina, Brazil, Chile, Paraguay and Uruguay). Subsequently, each of the Global Competitiveness reports of the World Economic Forum was searched from 2011 to 2015. These reports contain detailed profile for each of the economies included in the study and also an extensive section of data tables with global rankings covering over 100 indicators.

The empirical analysis of the hypotheses presented was performed using a regression model, where the dependent variable was sustainability.

Variables and measurement

As mentioned before, the concepts that were sought to correlate with the measurement of sustainability are: “Efficiency of legal framework in challenging regulations”, “Cooperation in labor-employer relations” and “Capacity of innovation”. Next, chosen measure of each variable of the model will be detailed.

The variable Efficiency of legal framework in challenging regulations was measured using the definition of the World Economic Forum (2011). For each country they measure the grade of difficulty “for private businesses to challenge government actions and/or regulations through the legal system” (p. 535). So, the variable has values from 1 to 5 where 1 means poor performance in the variable and 5 means good performance in the variable.

The next variable that was analysed was innovation. The variable Capacity of innovation was measured using statistics of the World Economic Forum (2011) and its Global Competitiveness Report. According to the report, this variable measure the capacity that companies have of innovating in a

specific country. So, the variable has values from 1 to 5 where 1 means poor result in the variables and 5 means goo result in the variable.

The variable cooperation in labor-employer relations was measured using statistics of the World Economic Forum and its Global Competitiveness Report. According to the report, this variable measure characterization of the labor-employer relationship (World Economic Forum, 2011). So, the variable has values from 1 to 5 where 1 means poor performance in the variable and 5 means good performance.

The purpose of this research was to find variables that are not included in the Sustainable Development index (SDI), and that can explain the behaviour of this variable, which in statistical terms means, that through a regression analysis a positive and relevant relationship is found between the variables described above (independent variables) and the SDI (dependent variable).

According to Hickel (2020) the SDI focuses on the ecological efficiency of nations in delivering human development. It addresses the limitations that the Human Development Index presents, such as Hickel mentioned: first, "the pursuit of development according to HDI requires that the world ´develops' to the point of ecological collapse" and secondly, "HDI embodies a contradiction whereby the process of generating high levels of development in some nations constrains development in other nations". For this reason, SDI's main objective is to accomplish both human development and ecological sustainability at the same time.

The variable SDI was measured using data from the study made by Jason Hickel with the help of Huzaifa Zoomkawala in Data management, data visualization and program coding. So, the variable has values from the study carried out. From year 2011 to 2015, due to the fact that until now the SDI values go up to 2015, and it was necessary to choose variables within the WEF report that were constant in the years and that were not included in some of the SDI components.

Managerial recommendations and expectations

Results

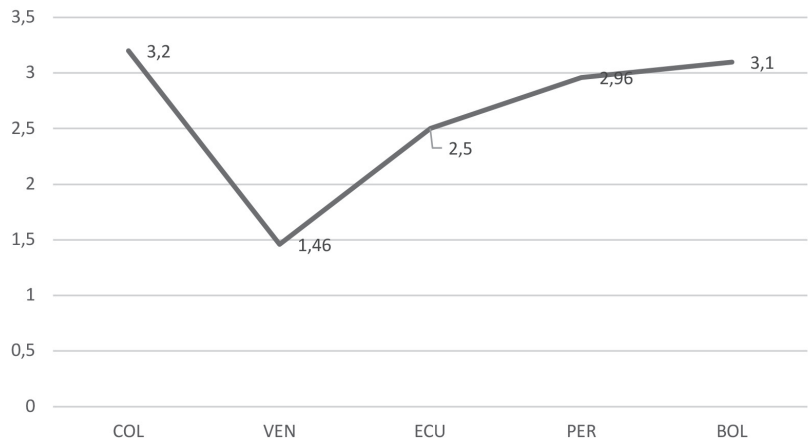
As mentioned in the study, data analysis was performed. The main findings are presented in detail below. A description of the behaviour of the variables is presented. Then, the results of a regression model are analysed, which seek to measure the impact of some variables on sustainability.

Behaviour of variables

The following part of the paper shows the average result that the Andean countries obtained in the variable "Efficiency of legal framework in challenging regulations" from 2011 to 2015. Figure 2 shows that Venezuela has the lowest score with 1.46 and that Colombia presents the upper average with a value of 3.2.

This variable demonstrates the quality of the legal framework of a country and how this in relation to companies impacts on their performance within the industry.

Figure 2. Efficiency of legar framework in chellenging regulations (average 2011-2015) Andean countries

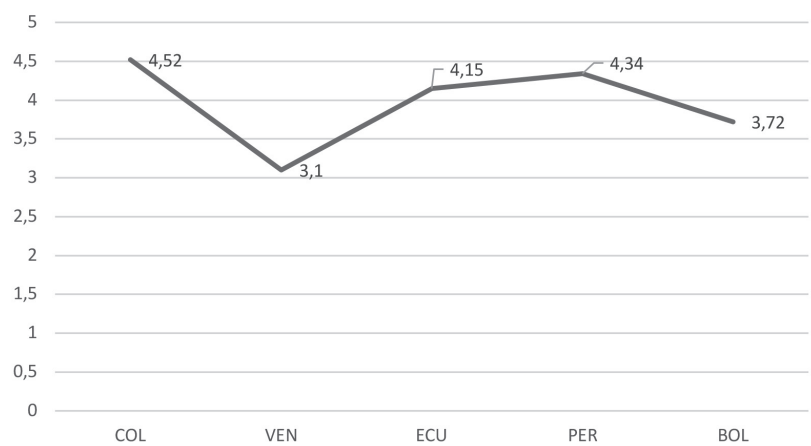


Source: Estimations based on World Economic Forum (2011-2015).

The following figure shows the average result that the Andean countries obtained in the variable "Co-operation in labor-employer relations" from 2011 to 2015, taken from the World Economic Forum's competitiveness report. It shows that Venezuela presents the lowest result, with 3.1, and Colombia with the highest, 4.5, in this case also Peru has a good performance in this aspect (figure 3).

This component focuses on the relationship that is created between the members of an organization. As detailed above when there is a healthy coexistence between employers and employees, it is possible to develop healthy environments of innovation and organizational development.

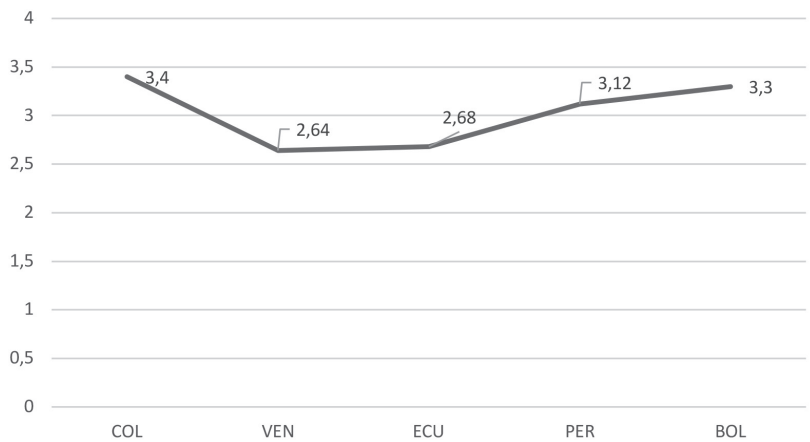
Figure 3. Cooperation in labor-employer relations (average 2011-2015) Andean countries



Source: Estimations based on World Economic Forum (2011-2015).

The following figure shows the average result that the Andean countries obtained in the variable "Capacity of innovation" from 2011 to 2015, taken from the competitiveness report of the World Economic Forum. On this occasion, figure 4 shows that Venezuela and Ecuador present very close results, 2.64 and 2.68 respectively. Colombia presents the highest value with 3.4, followed by Bolivia. This variable focuses on the existence of growth alternatives in the area of innovation in a specific country.

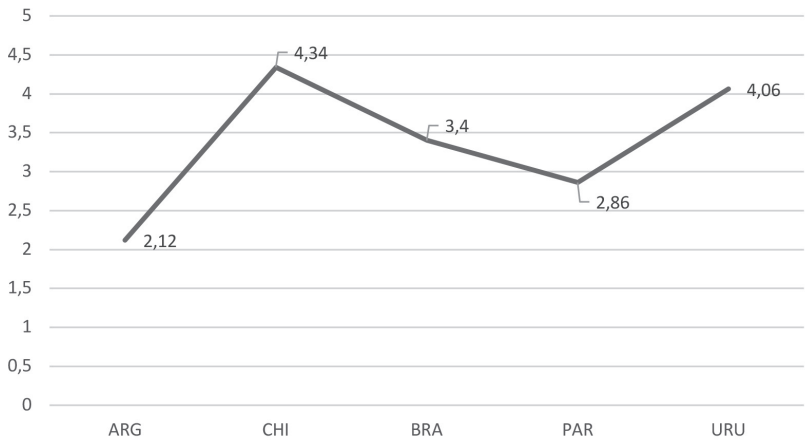
Figure 4. Capacity for Innovation (average 2011-2015) Andean countries



Source: Estimations based on World Economic Forum (2011-2015).

The following results are those obtained in the corresponding variables and presented in the report of the World Economic Forum from 2011 to 2015, in the member countries of the Mercosur treaty, plus Chile. Figure 5 shows the average result for each country in the component Efficiency of legal framework in challenging regulations. Argentina obtained the lowest score of 2.12 and Chile obtained a higher average, 4.3. Uruguay also had a good performance with an average of 4,06.

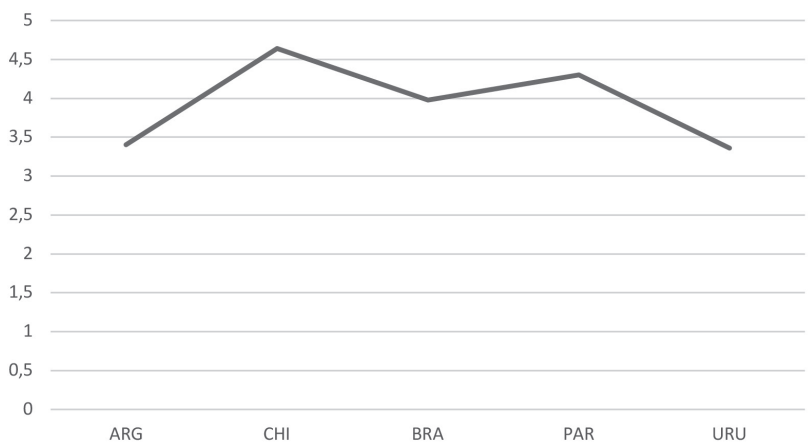
Figure 5. Efficiency of legar framework in chellenging regulations (average 2011-2015) Mercosur



Source: Estimations based on World Economic Forum (2011-2015).

Figure 6 shows the average of the result of each country in the component of Cooperation in labor-employer relations. It is observed that Uruguay obtained the lowest score of 3.36 and Chile obtained a higher average, 4.64, followed by Paraguay. Although Brazil is a big country in the region, its performance in the variables tends to be low.

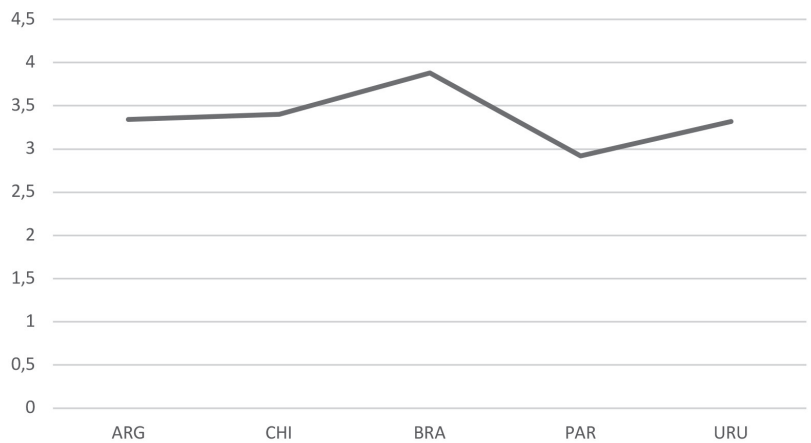
Figure 6. Cooperation in labor-employer relations (average 2011-2015) Mercosur



Source: Estimations based on World Economic Forum (2011-2015).

Figure 7 shows the result for each country in the Capacity for innovation component. It is observed that the five countries obtained similar ratings. However, with 2.92 Paraguay presents the lowest value. On this occasion, Brazil obtained the highest average, 3.88.

Figure 7. Capacity for Innovation (average 2011-2015) Mercosur



Source: Estimations based on World Economic Forum (2011-2015).

Relations between variables

First of all, the adjusted R Square explains the proportion of change that explains the behaviour of the dependent variable, which is attributed to the set of chosen independent variables, which are in this case: Efficiency of legal framework in challenging regulations, Cooperation in labor-employer relations and Capacity for innovation.

It can be concluded that these 3 components explain 62.5 % of the behaviour of the variable Sustainable Development Index (SDI) of a country. That 62,5 % of the change of the SDI score is due to the change in the legal component, que cooperation and capacity of innovation, according with the Adjusted R Square.

Table 1. Regression Statistics

Multiple R	0,80580382
R Square	0,64931979
Adjusted RS	0,62594111
Standard Error	0,03592599
Observatios	49

Source: Estimations based on World Economic Forum (2011-2015).

According to the t-stat value in the table 2, the relationship between the Efficiency of legal framework in challenging regulations and the score of sdi is negative. This means that when a country's result in the efficiency category of the legal framework increases, the behavior of the result in SDI will decrease. According to the result of the coefficient, this change will be an amount of 6.1 %. Following Zimmerman (1997), the significance of this variable is evaluated using the value of the t statistic. The results show that the t value for the variable is -8.501, which means that this relationship is significant for a t of 0.005, according to the table that evaluates confidence intervals and hypothesis tests.

According to the t-stat value in the table 2, the relationship between the Cooperation in labor-employer relations and the score of SDI is positive. This means that when a country's result in the category of employee-employer cooperation increases, the behavior of the SDI result will be the same. Depending on the result of the coefficient, this change will be an amount of 7.3 %. Following Zimmerman (1997), the significance of this variable is evaluated using the value of the t statistic. The results show that the t value for the variable is 6.542, which means that this relationship is significant for a t of 0.005, according to the table that evaluates confidence intervals and hypothesis tests.

According to the t-stat value in the table 2, the relationship between the Capacity for innovation and the SDI score is positive. It is possible to interpret that when the result of a country in capacity of innovation increases, the behavior of the SDI will show a positive, albeit slight improvement. Depending on the result of the coefficient, this change will be an amount of 0.03 %. However, this relationship is not significant since the value of the t statistic is low 0.0302.

Table 2. Model results

Variable	Coefficients	Standard Error	T stat
Intercept	0,635011988	0,049132062	12,84615617
1.11 Efficiency of legal framework in chellenging regulatios***	-0,061130283	0,007190788	-8,50119413
7.01 Cooperation in labor-employer relations***	0,073289779	0,011202417	6,542318631
12.01 Capacity for innovation	0,000380537	0,012588883	0,030228034

*** Statistically significant relationship according to the t value

Source: Estimations based on World Economic Forum (2011-2015).

Limitations

This research faced some methodological limitations. It was not easy to find data to measure variables such as. However, this was solved using measurements that for the countries had already been constructed by entities such as the World Economic Forum and the study realized by Hickel with the support of the database for Human Development Index, the material footprint indicator of each country derived from the UN International Resource Panel Global Material Flows database (Vienna University of Economics and Business, 2018) and the data for CO_2 emissions derived from the Eora MRIO database (2019).

Although there were no data for an extensive period, in the investigation it was possible to construct a very interesting series for an important period of years and data were also obtained for several countries in the Andean region Mercosur and Chile for all the variables in the study.

Other limitations of the study had to do with the number of innovation initiatives that end up effective and that are related to sustainability. Well, although there are alternatives to develop new business models, processes, products, etc. They are not necessarily intended to improve the conditions of the environment and low-income people.

Contribution to the research

The results of this research have different implications. For managers, this research shows that a healthy environment among the members of a company is important to achieve not only internal goals but also to aim at country goals. This can be achieved if there are no rigid hierarchies that do not allow free dialogue between employees, or if healthy environments are developed within the company for the development of innovative proposals such as creation rooms.

On the other hand, it also shows that companies often seek to challenge a country's legal framework, even though laws, to seek their own benefit, can have an impact on future political initiatives. If managers are aware that the idea is to improve the legal framework for the benefit of society and the protection of the environment, they will know that it is better to create regulations hand in hand with the state that facilitate the application of strategies with social and environmental approaches. In this way, market conditions, access to resources, tax benefits and the image of the company are improved.

From another perspective, these results present interesting ideas to policy makers. On the one hand, policy makers must focus on initiatives that impact business activity, be strictly evaluated in cases where they are brought to trial. This in order that companies do not manage to face the legislation and modify them to their own benefit. When the function of a norm that falls on the business sector is questioned, the stakeholders must be examined, and risk analysis applied in different scenarios.

This research gives policy makers valuable information as it shows them that the problem lies in the effectiveness of the legal framework to prevent the actions of the business sector from deteriorating common goods and that in the long term does not allow new generations to enjoy the resources of the present.

Rather than challenging the state, entrepreneurs must work together to help make the transformation to more sustainable economies less drastic and bring benefits in all sectors.

This research raises future fields of research. On the one hand, it would be important to continue delving into the relationship between variables capacity for innovation and sustainability, since they represent a valuable point of intervention to design entrepreneurial methods or social business models that can be more effective and aimed at specific objectives of sustainable development.

Future studies could delve into the effects that variables As a degree of state corruption and transparency, they possess the degree of sustainability that a country develops, especially in countries with a conflicting political history. Since they are countries where developing laws and policies to protect resources, it can be much more difficult and therefore the business sector must take much of the responsibility within the industry to develop new processes, to improve the conditions of society.

Conclusion

The result of the negative relationship between the variable "Efficiency of legal framework in challenging regulations" and the SDI variable may be due to the fact that many times the legal framework of a country can be easily influenced by powerful companies, which have large investments and do not want to focus in sustainability. If this type of companies can impact the regulation around environmental initiatives, under capitalist excuses, in the end the cooperation between state and business sector will not bring positive consequences in the sustainable development of the country.

Also, when business initiatives that are carried out hand in hand with the state, and end because of bribes, can be considered ineffective. In fact, there is no such cooperation that is expected between the government, because they are not the result of a real process that seeks the well-being of the environment. On the contrary, when companies can go beyond the law, and no real initiatives are seen, the legitimacy of the state and especially of the legal framework loses credibility.

It can explain why the behavior of the variables, especially in Latin American countries, which have gone through various times of political instability, in which the state and the business sector have been unable to agree. As a result, in recent years, these countries have begun slight advances in sustainability issues, but the legal framework in the respective markets still needs to be efficient enough to adapt to the real needs of companies that advocate for the environment and social welfare.

Secondly, the positive results of the variable Cooperation in labor-employer relations are consistent with our second hypothesis. When there is a healthy work environment, it is possible that initiatives or new sustainability alternatives may emerge from the basic levels of the company to support the company's strategies. When this cooperation is perceived within the companies of a country, it can be expected that it will obtain better results in terms of sustainability.

Finally, the variable Capacity for innovation presents a positive relationship with respect to the result in the evaluation of sustainability of a country. This means that a large part of the organizations that can be helping the environment through innovative initiatives, allows the country's profile in relation to sustainability to be better.

In fact, much of the possibility of innovating is not only aimed at the private sector, when state organizations focus on sustainable models of helping society, the positive impact in the country, improves its image and also the results in sustainability.

In conclusion, facing the sustainability dilemma, the responsibility does not fall only on the state or only the business sector. Both must cooperate, and not try to take advantage of the scarce resources in the world. Although countries will make a transition to relying on more environmentally friendly economies, the new ideas that emerge today will be vital for such an event. When there are ways people cooperate with each other, new projects are born, and with the commitment and support of third parties it is possible to evaluate all kinds of projects aimed at the well-being of others.

Changing the business reality of a country to be sustainable is not a linear change, but with small initiatives and advances, they can be increasingly ensured for future generations.

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