



Global competitiveness Index vs. economic growth: Analysis of relationship in the Dominican Republic Context

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This research studied the relationship between the Global Competitiveness Index (GCI) and Economic Growth (EG), motivated by the apparent decline of the Dominican Republic (DR) in the 2017-2018 report, with respect to the previous. As the World Economic Forum (WEF) prepared its reports using data from international cooperation and financing organizations, the concept of competitiveness was evaluated by analyzing data on indicators from the same type of institutions. As some leading scholars had previously stated, the investigation results contradict the WEF's statements about a direct positive relationship between EG and the GCI. Moreover, the negative impact of assessing the GCI indicators based on responses of senior business executives to surveys applied by the WEF was also determined in the DR context.

Keywords: Global Competitive Index, economic growth, Dominican Republic

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Introduction

The World Economic Forum (WEF 2018), since 1979, has been publishing the Global Competitiveness Index (GCI) as an indicator of performance for most of the world's countries. After assessing the competitiveness of nations, in their report from 2017-2018, they define competitiveness as a set of institutions, policies, and factors that explain a country's productivity level. That refers to the prosperity that an economy can achieve and the rates of return obtained by investing in that economy. Both elements are the drivers of its Economic Growth (EG). The most competitive economy is the one that is more likely to grow quickly over time, and the index measures this growth potential using weighted averages of different components. The GCI components are organized into twelve categories or pillars and grouped into three sub-indices. In addition, the index incorporates statistical data provided by entities such as International Monetary Fund (IMF), World Bank (WB), International Labor Organization (ILO), International Telecommunications Union (ITU), United Nations Organization for Education, Science, and Culture (UNESCO), World Health Organization (WHO), Inter-American Development Bank (IDB), among others. In addition, they include indicators determined from the Executive Opinion Survey, applied by the WEF to reflect qualitative aspects of competitiveness and correct the lack of data on many economies (World Economic Forum 2018). The basic requirements of the global competitive pillars are

institutions, infrastructure, macroeconomic environment, macroeconomic stability, health, and primary education. The efficiency enhancers of the global competitive pillars are higher education and training, good market efficiency, labor market efficiency, financial market development, technological readiness, and market size.

Moreover, the innovation and sophistication factors are business sophistication and innovation capacity (World Economic Forum 2018). In the 2017-2018 GCI report, the DR outcomes appeared to have deteriorated from the previous report compared to other countries of the region. This made us check the results obtained by Panamá, Trinidad and Tobago, Jamaica, Guatemala, Nicaragua, Honduras, Costa Rica, and DR in the GCI Report and the data about EG of WB from 2007 to 2016, and the comparison yielded a contradiction, as can be seen in Table 1. Countries with less EG than DR and Nicaragua had a better GCI rank, so it is intuited that there is no direct relationship between both indicators because this negates the explanations of WEF cited previously.

Table 1. Comparative EG and GCI / Averages (2007-2016)

<i>Countries</i>	<i>EG</i>	<i>GCI</i>
Costa Rica	4.09	4.31
Dominican Republic	5.31	3.77
Guatemala	3.52	4.01
Honduras	3.28	3.89
Jamaica	-0.06	3.90
Nicaragua	4.17	3.64
Panamá	7.23	4.36
Trinidad and Tobago	0.73	3.94

Source: the author, from the GCI and WB data

Particularly for DR, the place occupied in the GCI and the level of EG during the time frame analyzed, at first glance, show that there is no direct relationship between the two indicators, as the values presented in Table 2 revealed.

Table 2. Comparative Matrix GCI vs. EG

<i>Year</i>	<i>GCI</i>	<i>EG</i>
2007	3.65	8.71
2008	3.72	3.21
2009	3.75	0.95
2010	3.72	8.32
2011	3.73	3.10
2012	3.77	2.79
2013	3.76	4.74
2014	3.82	7.61
2015	3.86	7.04
2016	3.94	6.65

Source: the author, from the GCI and WB data

On the other hand, the country's rating is demerited when more information from surveys and less concrete numerical data are used, as can be validated by Table 3. This situation motivated an investigation of those results based on pragmatic epistemology (Creswell 2014). This epistemology states that knowledge arises from actions, situations, and consequences, allowing researchers to use multiple research methods according to their needs and purposes. So, different points of view can be expressed,

and various forms of data collection can be applied because the problem is more important than the methods, and all types of approaches are used to understand it.

Table 3. Comparative Matrix Place in Ranking versus Percentage of Answers to Surveys

<i>Pillars</i>	<i>Comparison Items</i>		
	Indicators	<i>DR Place Obtained</i>	<i>Answers to Surveys (%)</i>
<i>Institutions</i>	Global Competitiveness Index	8	100
	Global Innovation Index	5	88
<i>Infrastructure</i>	Global Competitiveness Index	7	67
	Global Innovation Index	3	40
<i>Macroeconom ic</i>	Global Competitiveness Index	2	0
	Economic Growth (WB)	2	0
<i>Environment</i>	Inflation in Consumer Prices (WB)	2	0
<i>Health and Primary Education</i>	Global Competitiveness Index	7	40
	Universal Health Coverage (WHO)	3	0
	Doctors / 10 thousand People (WHO)	3	0
	Student / Teacher Ratio (UNESCO)	2	0
	Net Primary Enrollment Rate (UNESCO)	3	0
<i>Higher Education and Training</i>	Global Competitiveness Index	5	25
	Tertiary Education Rate (GII)	2	0
	Training Companies (GII)	1	0
	QS Ranking QS for Universities	3	0
<i>Goods Market Efficiency</i>	Global Competitiveness Index	7	94
	Import of Goods and Services (WTO)	3	0
	Export of Goods and Services (WTO)	3	0
<i>Labor Market Efficiency</i>	Global Competitiveness Index	7	90
	Labor Productivity (OIT)	2	0
	GDP / Employed Person (OIT)	3	0
	Employment Rate (OIT)	3	0
<i>Financial Market</i>	Global Competitiveness Index	8	100
	Access Points / 100 thousand Adults (IDB)	2	0
<i>Sophistication</i>	Credits for People Over 15 Years Old (IDB)	1	0
	Regulated Financial Intermediaries (IDB)	3	0
	Bankruptcy Risks (WB)	4	0
	50 Largest Banks in Latin America (S&P)	3	0
<i>Technological Readiness</i>	Global Competitiveness Index	5	43
	Foreign Direct Investment (ECLAC)	3	0
	Internet Users as a Population % (ITU)	3	0
	Mobile Broadband	3	0
<i>Market Size</i>	Global Competitiveness Index	1	0
	GDP (WB)	1	0
<i>Business Sophistication</i>	Global Competitiveness Index	8	100
	Global Innovation Index	2	27
<i>Innovation Capacity</i>	Global Competitiveness Index	7	86
	Production of Technology & Knowledge	4	15
	Creative Production	3	15

Based on the apparent decline of the Dominican Republic in its 2017-2018 GCI rating, the two following objectives were defined for the investigation: (1) to verify if there is a direct positive relationship between the GCI and the EG, and (2) to prove whether the method of gathering information to determine the value of an indicator affects the qualification obtained by a country in the GCI.

Theoretical Framework

For successful economic growth, a country must advance competitively driven by factors of production, investment, and innovation, so the GCI was developed by the WEF to provide a picture of the growth potential of an economy (Delgado et al. 2012). In that sense, this indicator has been used by policymakers, business executives, and academics as a tool that shows an economy's productivity and its ability to prosper and grow sustainably (Sala-i-Martin 2016). Therefore, the GCI has become an essential reference for governments, which react differently to the annual results of their countries (Xia et al. 2012). Despite the GCI having been assumed as a helpful tool, some researchers question its validity. Krugman (1994), Nobel Prize in Economics, stated that competitiveness is meaningless when applied to national economies. In that sense, Lall (2001) pointed out that some analytical, methodological, and quantitative problems prevent the GCI from inducing a better economic performance. It should also be noted that the ranks of some countries have not been stable over the years, and an index could not be a good standard if it is not so stable (Xia et al. 2012). While Van Stel et al. (2005) acknowledged that GCI could not predict EG well when combined with other variables.

McArthur and Sachs (2002) emphasized that the index authors have linked GCI with EG using past growth as the dependent variable and admitted the need to validate that GCI can help explain future rather than past growth. They also indicated that the research into economic growth is in progress. The understanding of the relevant technological, institutional, geographical, and societal factors enhances continuously, so the WEF is constantly updating the framework used in the GCI. For their part, Bernardi et al. (2004) explained that the indicators were called informative, predictive, and program evaluative to support analysis in any complex field. To them, an indicator results from the disarticulation of a complex phenomenon, observing its fundamental components and its reassembling through rationalized aggregation, weighting, and transformation procedures.

Therefore, different frameworks refer to the qualitative and the quantitative, the subjective and objective, external sources and original surveys, the research of connections, and reasonable comprehensive visions. In that tenor, they argue that objectivity in measuring a complex construct is more formal than substantial. Hence, the measurement needs to be based on factual evidence as opposed to a measurement based on an opinion. Moreover, it must be considered that people's perception of something is instinctively based on the comparison, so respondents' perceptions will also differ with their different perspectives, their background, wealth, and experience (Kaufmann et al. 2005).

The previous approaches guided us to define the research questions as follows: a) Would the GCI directly impact the economic growth of nations? b) Is there any relationship between the period analyzed and the results in the GCI? c) Does the place obtained in the ranking depend on the percentage of data obtained from surveys? d) Does the source of the data affect the weighted weight of the indicator and, therefore, the DR classification in the GCI ranking? Considering the above, a conceptual framework was developed, as shown in Figure 1. It reflects the incidence of the time on GCI indicators, as well as the impact of the nature of the indicator and its characterization in the country's qualification. In addition, the researcher considered the possibility that GCI directly affects the EG.

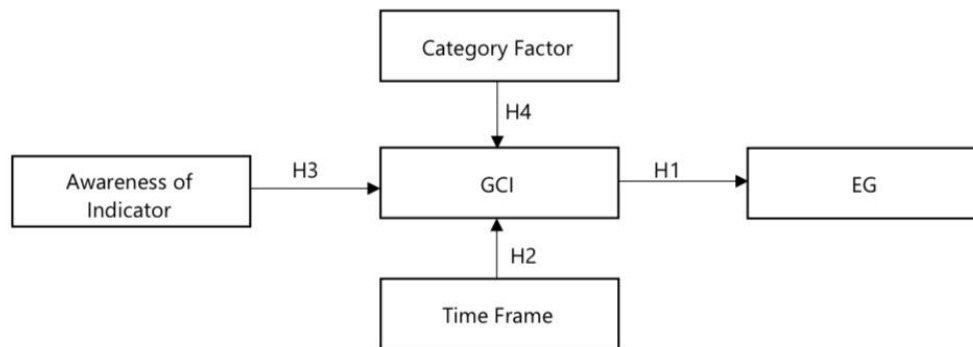


Figure 1. Conceptual Framework
 Source: the author

Hypothesis Development

To better analyze the situation with the DR rating in the GCI 2017-2018 report, four hypotheses capable of contributing to understanding the causes of the phenomenon were defined. The behavior of the data corresponding to the GCI and the EG show results that do not indicate a direct correspondence. For example, the DR score for the GCI in 2016 was 3.94, while the value of its EG was 6.65. In 2009 the EG was .95, and GCI was 3.75; in 2007, the EG was 8.71, and the GCI was 3.65. The non-correspondence is evident, as shown in Table 2. To achieve global competitiveness, a nation must accomplish high economic growth rates, usually measured with the increase in their Gross Domestic Product (GDP) (Poi & Ekekwe 2017; Poi 2020; as cited in Oke et al. 2022). Data from entities such as World Economic Forum (2017), World Bank (2018; 2019), International Monetary Fund (2017), World Trade Organization (2017), Economic Commission for Latin America and the Caribbean (2017), Inter-American Development Bank (2017), World Intellectual Property Organization (2017), International Labour Organization (2017), S & P Global Market Intelligence (2017), among others, supported the comparisons between the places obtained by DR in the reports of said institutions, taking in account the statement of Ketels (2016) that the economic growth reflects the productivity of a country. In the GCI 2017-2018 report, five Central American and Caribbean nations scored better than the Dominican Republic (3.9). These countries were Costa Rica (4.5), Panama (4.4), Jamaica (4.2), Guatemala (4.1), and Trinidad and Tobago (4.1), while Honduras (3.9) and Nicaragua (3.9) had the same rating as DR in the ranking. Based on these observations, the researcher establishes the first hypothesis:

H1. There is a significant relationship between GCI and EG.

The interest is to prove that the WEF's statements regarding the direct relationship between the GCI and the EG do not correspond to reality, as shown in the case of DR analyzed in this investigation. The data behavior of the DR ratings in the GCI during the period selected tends to a positive increase, although with moments of decline. From 2007 to 2009, it went from 3.65 to 3.75, and then dropped to 3.72 in 2010 to go up to 3.77 in 2012. In 2013, it was reduced to 3.76 and then assumed a continuously increasing trend up to 3.94 in 2016. In other words, the periods of rating improvement and rating reduction are presented in a staggered manner. From 2007 to 2009, there was an increase, and from 2009 to 2010, there was a decrease. A new increase happened from 2010 to 2012, and another decline occurred from 2001 to 2013. Finally, from 2013 to 2016, a new increment materialized. (Ketels 2016; WEF, 2017-2018). As the GCI is linked with EG using past growth as the dependent variable (McArthur and Sachs, 2002), it was

necessary to validate if there was any relationship between the results obtained and the time elapsed during the period analyzed. Hence, it hypothesizes:

H2. There is a significant relationship between the period (2007-2016) (Time Frame) and GCI.

Chun and Larrick (2022) found that the influence of ranks was justified by the extent to which decision-makers prioritized the top-ranked option and overlooked the other options when given rank information. Berg et al. (2022) argued that the analyses of the reasons for measurement divergence detected a rater effect where a rater's overall view of a firm affected the measurement of specific categories. As shown in Table 3, the results of DR improve in each pillar of the GCI using indicators based only on numerical data. If the information comes from responses to surveys, the results deteriorate. Something similar happens when we use another type of indicator for comparison. In the case of the Institutions pillar, the DR obtained the last place compared to the countries selected for the study. Still, the qualification in this indicator depends 100% on answers to questions from surveys. The same happened with the Financial Market and Business Sophistication pillars (WEF 2017-2018). While in the opposite direction, DR obtained first place in the Market Size pillar and second place in the Macroeconomic Environment pillar, which depends 100% on tangible data (WB 2017-2018). This observation led us to the 3rd hypothesis, to validate the data from pool incidence in the results for DR in the GCI ranking:

H3. There is a significant dependence between percentage data from poll (awareness) and place in GCI.

The empirical evidence from Russian software SMEs operating in global niche markets of Mihailova et al. (2020) revealed that managers perceived institutional influence on their firms' ability to be internationally competitive in several direct and indirect ways. There are negative impacts of institutions and triggering forces that incentivize SMEs' global expansion and evolution of competitive advantages (Mihailova et al. 2020). Taking into account the fact that 7 of the 12 pillars of the GCI use from 85 percent to 100 percent of the responses to the survey, the weight of the indicator within the evaluation could have had a pernicious incidence in the DR results in that sense, another hypothesis was developed, to identify the categorical relationship between the pillars of GCI in the DR case:

H4. Institution and market size have different categories.

Methodology

Based on the approaches of Creswell (2014), Crotty (1998), and Yin (1981), a hybrid of quantitative and descriptive or cross-sectional research was applied to determine whether there is a relationship between the GCI and the EG and to validate if the method used to raise the information affect the score in the GCI ranking. Pragmatic epistemology contributed to the strategy to search for information, define topics of interest, and collect data from the review of documentary information on economic and social performance indicators from 2007 to 2016. This information came from the same type of entities that provide data to determine the GCI (WEF 2017-2018), and the results obtained by DR and the seven nations of Central America and the Caribbean that exceeded DR in the GCI 2017-2018 were tabulated. Also, a table was structured to show the DR rating in the GCI Index and the levels of EG, as well as another table relating the place obtained by DR with the percentage of answers to surveys used in the indicators. To analyze the significant relationship between GCI and EG, and between the period 2007-2016, an Interrupted Time Series Analysis was applied, using an adaptation from the Fortran program written by Glass and Maguire and based on Box and Tiao IMA (1,1) procedure, (Gottman et al. 1974). Regarding the level of significant dependence between the percentage of data from the poll and the place obtained by

DR in the GCI report, categories of the pillar were evaluated by correspondence analysis since it allowed us to graphically represent the dependency of the place obtained for the % of indicator data taken based on surveys, both variables characterized as categorical (Fernández 2011).

Results and Analysis

Given the categorical characteristic of the data and the sample size, a non-parametric analysis evaluated their relationship. In this case, the GCI is the independent variable, while the EG is the dependent variable. Therefore, the Interrupted Time Series Analysis *validated hypothesis number 1 (H1), so there is not a significant relationship between GCI and EG* because the relationship between each pair of numeric variables of the dataset had resulted in a correlogram lag 1 $r=1$, but the negative association was not significant due to small sample size, since $\rho=-.01$, $t=-.41$ and $p=.68$. Then, GCI did not cause EG given the results of the Granger Causality Test, where $Y=f(X)=F=3.384$ and $p=.01$. Moreover, the level of correlation between the 2007–2016 period and GCI, was expressed by a correlogram lag 1 $r=6.90$, indicating that the time series data is not randomly related or due to chance alone. The computed Spearman's $\rho=.94$ ($t=7.95$, $p=.00$) *indicated a significant relationship between the period (2007-2016) and GCI*, confirming *hypothesis number 2 (H2)*. Considering previous results, a Spearman Rank Correlation Test was applied between Years & GCI, based on time series data without missing values=10, and applying $t(df:8)$ distribution (two-tailed), validating these results.

To determine the relationship between the place ranked DR in the GCI and the information for the qualification collected through polls, hypotheses 3 and 4 were evaluated based on a matrix that compares Place in Ranking versus percentage of Answers to Surveys. First, *hypothesis 3 (H3) about the significant dependence between percentage of data from the poll (Awareness) and the place in GCI was validated*, considering the resulting values of the computed Chi-square=22 with $df=11$ and $p=.02$. Also, the likelihood ratio test (*Likelihood Ratio=24.55*, $p=.01$) showed that a higher degree of awareness results in the worst place in GCI. Figure 2 shows the inverse relationship of the position occupied in the GCI for the percentage of data from responses to surveys. The higher the percentage, the worse the position occupied.

Table 4. Awareness on Indicators

Interpretation		Factors	Inertia	Proportion of Inertia
Weakest	1	Macroeconomic Context	.11	.03
	2	Market Size	.16	.04
	3	Higher Education & Training	.19	.05
	4	Technological Readiness	.22	.06
	5	Health and Primary Education	.25	.07
	6	Infrastructure	.27	.08
	7	Innovation Capacity	.29	.09
	8	Labor Market Efficiency	.32	.09
	9	Financial Market Sophistication	.33	.10
	10	Business Sophistication	.35	.10
	11	Good Market Efficiency	.37	.11
Strongest	12	Institution	.39	.11
	Total Inertia=3.31, Inertia=.28			

Source: the author

Finally, the correspondence analysis stated, as can be seen in Table 4, that the values in the proportion of inertia for the indicators entitled Institution (.11) and Market Size (.04) confirmed the more significant incidence in the GCI rank of the pillars more supported by answers to poll than in numerical data, taking in account degree of awareness on indicators.

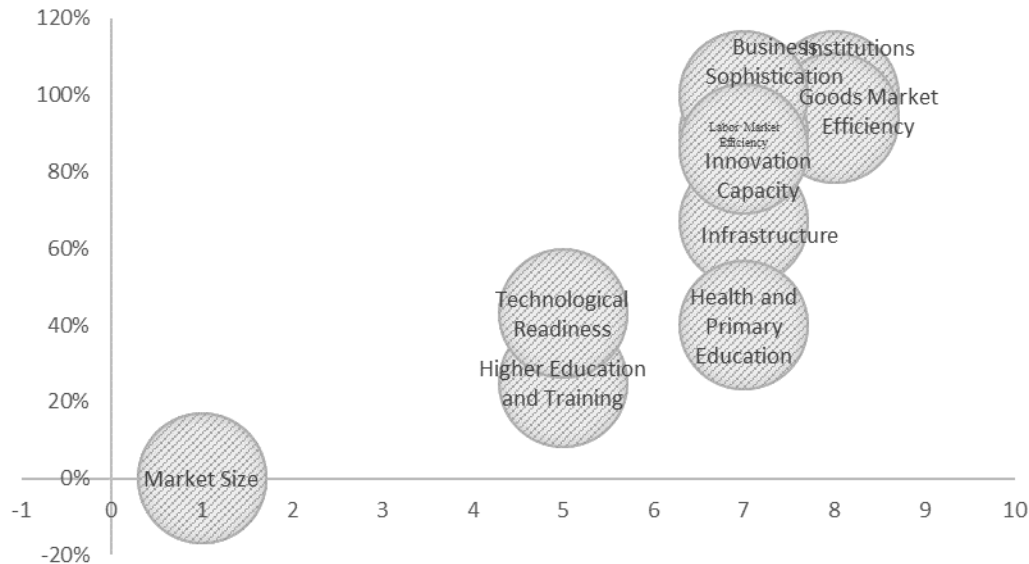


Figure 2. Graphical Analysis of the Place in GCI and Awareness of the Pillars

Source: the author

Discussion

In this section, the results of this research are explained and evaluated with reviewed literature according to each hypothesis tested. The *H1—There is a significant relationship between GCI and EG—is not statistically generalized in this research. The negative rho value indicates an inverse relation for the variables, and a lower p-value signifies a greater significance of the observed difference. Moreover, a $p \leq .05$ is generally considered statistically significant, and the difference is not due to chance alone (Fernández 2011). In that tenor, a statistically significant correlation does not necessarily mean that the strength of the correlation is strong, but when p-value is below the significance level indicates statistically significant lags. In contrast, those above indicate no statistically significant lags (Akoglu 2018). Therefore, the results showed no significant relationship between GCI and EG, given that there is a strong correlation with a low statistical significance. The *H2—There is a significant relationship between the period (2007-2016) (Time Frame) and GCI—was validated based on a similar criterion, indicating that the values of the GCI have some correspondence with the years, that is, not originated in an arbitrary cause only or due to chance alone. Also, the Spearman rank correlation test supported this premise based on time series data without the number of missing values specified and applying a two-tailed t distribution.**

The *H3—There is a significant dependence between percentage data from poll (awareness) and place in GCI—was evaluated based on a matrix that compared place in ranking versus percentage of survey answers. The chi-square and the likelihood ratio analyses showed that a higher degree of awareness results in the worst place in GCI. This corresponds to Kaufmann et al. (2005) affirmation of the direct relation of perception with comparison, regardless of perspectives, background, wealth, and experience. Hence, the incidence of the data from the poll is bigger because they weigh more than factual data. This also justifies Bernardi et al. (2004) remarks that every construction of complex indicators must respect the*

accurate rules of measurement and aggregation on which it is focused. Also, they affirmed that there are different levels of separation between the intention to arrive at a judgment on a complex dimension and its realistic measurement based on the system of operational conditions adopted and related to methodological rigorousness. In this case, the perceptions reflected in the answers from the persons surveyed had a stronger incidence in the classification in the GCI because they participated in a greater proportion, so a high degree of awareness was converted to a worst ranking place in GCI. Nevertheless, the validated trustworthiness of the data structure used in classifying the different global competitive pillars is necessary to improve the methodology to reflect reality. Chun and Larrick (2022) and Berg et al. (2022) assert that the rater's awareness as affected by various exposures and situations affects the ratings.

The final *H4—Institution and market size have different categories—is* another factor in this research, as also separately emphasized in the study of Mihailova et al. (2022). The correspondence analysis stated that the values in the proportion of inertia for the indicators confirm the bigger incidence in the GCI rank of the pillars more supported by answers to the poll than in numerical data, taking into account the degree of awareness of indicators. The inertia of a component has been defined as the amount of variation that the component explains, and its proportion indicates the part of the total inertia that is explained by each main component. Therefore, low inertia means that all the points are located very close to the center of gravity and similar. In contrast, high inertia values could imply significant differences from the rows or columns' average profile (Fernandez 2011). In this case, the global competitive pillars named *institution* and *market size* have different categories related to their incidence level, based on the place in GCI due to the degree of awareness (Mihailova et al. 2022).

Conclusion, Implications, and Future Directions

The GCI, for decades, has been considered a driver of the EG. Still, this research has shown no significant relationship between GCI and EG, although the behavior of the data corresponds to the period analyzed. Moreover, the study confirms a significant dependence between % data from poll (Awareness) and place in GCI. In other words, while there is a greater proportion of evaluations supported by the subjective perceptions expressed in response to surveys, the worse the position in the GCI ranking will be for some countries. The WEF must redesign some of the elements used to assess the competitiveness of countries. A greater proportion of indicators based on data, not perceptions, is required since economic growth and development are concrete results that can be measured through objective variables. The case of DR makes evident that the indicators used in the GCI to qualify each country's performance need to be improved to reflect reality better. Besides, moving effectively from the current place in the GCI to a special place deserves to take advantage of the momentum and facilitation generated by the results obtained from the country and expressed through concrete numerical data. It also requires improving the perceptions expressed through the surveys applied by the WEF and defining a communicative plan in each State institution to enhance the stakeholders' perception of the country's performance based on concrete and tangible facts. Also, it is necessary to propose improvements to the WEF on how to measure better some performance indicators to guarantee a greater attachment to reality. Moreover, it is important to apply benchmarking to take advantage of experiences from countries that surpass DR in a real way, as well as generate conditions of synergy between state and private institutions since they directly impact the country's competitive performance.

Regarding future actions, as the study detected the discrepancies between the reality expressed by the factual data and the perceptions of the surveyed stakeholders, the reasons for the differences must be determined. This research's results open space for future studies in two ways. One has to do with how to restructure the indicators to evaluate the pillars of the GCI so that there will be a correspondence between the results based on data and responses to surveys. It is also important to extend the study to other regions to confirm if the phenomenon occurred with the DR occurs. If this is the case, the WEF will be

compelled to take action to guarantee a more precise way to evaluate and rank the different countries of the world. The second way broadens the spectrum to analyze whether, in other global indices, the detrimental effect in the rating for some countries is evident due to the subjectivity of perceptions communicated in the polls answers, in contrast to reality expressed by the actual data. Added to the above is the fact that the use, in a high proportion, of perceptive answers to evaluate the performance of countries has a negative effect on different nations in the world, as shown in the Dependence Analysis as in the case of the DR, this part of the results makes evident that the indicators used in the GCI to qualify the performance of each country need to be improved so that they can better reflect reality.

Limitations

The key limitations for this research are related to the number of years considered in the GCI report, since given the fact that a decade was taken, only ten values were considered, which generated restrictions for a complete statistical analysis. The point of evaluating a single country implied needing to compare results that could reinforce the findings and the conclusions derived from them. On the other hand, the high number of indicators and their components used to qualify the countries makes the work very laborious in operational terms since the analysis cannot be automated. It is important to consider the propensity to use surveys in response to the labor difficulties in locating and using numerical data, the challenges to minimize the bias associated with the individual perception of phenomena, and the mitigating effect of peer pressure. Interest groups on personal opinions related to the dynamics of institutional information gathering in some state and private entities. Another limitation is the need for more indicators based on actual data due to the difficulties in measuring some phenomena related to the provision of services to satisfy necessities or resolve problems.

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