



# Caribbean's Global Competitiveness from a Systemic and Multifactorial Perspective for the Post-Covid-19 Period

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## Abstract

International prestige institutions, such as The World Economic Forum, the Institute for Management Development, and the Institute for Industrial Policy Studies, produce competitiveness studies that do not include all Caribbean's countries. Moreover, some researchers argue that these studies have limitations when applied to small economies such as Latin American countries, especially the Caribbean. This research's objective is to perform a competitiveness analysis focused on the Greater Antilles countries which at best are included in competitiveness analysis as a group of regional countries. This pioneering research presents a regional competitiveness ranking for the Caribbean countries for the trans-Covid-19 period using as framework the Double Diamond Dual Model (DDD). The DDD is a very effective model for evaluating regional countries competitiveness indices since it permits for the determination of both overall competitiveness indices for each country and the determination of the most important factors driving their competitiveness level. The results show that among the Greater Antilles Puerto Rico enjoys a higher overall competitiveness level having better competitiveness levels in three constructs: International Physical Factors, National Human Resources, and International Human Resources. It is only surpassed by the Dominican Republic in the National Physical Factors construct.

**Keywords** Country competitiveness · Greater Antilles economies · Caribbean countries · Dual double diamond model

**JEL Classification** O15 · O19 · O54 · O57 · P52 · R11 · Y10

## Introduction

Countries' competitiveness allows countries and companies to successfully face international competition domestically and in global markets (Castro-González et al., 2016; Porter, 1990). Nevertheless, Zamora and Ortiz (2021) stated that competitiveness is not only limited to countries and

companies, but it is applicable at other different levels: global, regional, and industries.

Presently, there are two international prestige institutions that measure nations' competitiveness, the Institute for Management Development (IMD), and the Institute for Industrial Policy Studies (IPS). Until 2020, the World Economic Forum (WEF) also published a competitiveness index. However, some researchers argue that these rankings have limitations when applied to small economies such as the Caribbean (Castro-González et al., 2014; Cho & Moon, 2013; Cho et al., 2016; Moon et al., 1998). Moreover, Moon et al. (1998) and Castro-González et al. (2016) argued against putting all world countries in the same basket, knowing their differences in idiosyncrasy, economic development, per capita income, among other features. Therefore, analyses that produce national and global competitiveness "rankings" should be studied with greater attention.

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## Caribbean Countries Challenges

Cho et al. (2016) stated that competitiveness analyzes should consider the countries under analysis geographical area. Consequently, this research focus are the Caribbean countries known as the Greater Antilles, grouped as a set of regional countries sharing similar customs, idiosyncrasies and both macroeconomic and microeconomic indices. In many circumstances, these countries are complementary and in other are competitors, which reinforces the criterion of executing competitiveness analysis on a regional basis to generate comparative competitiveness “rankings”.

Undoubtedly, the COVID-19 global pandemic today plays an important role in the Greater Antilles competitiveness level. The pandemic has defined a new way of doing business and continue doing business has required to make severe adjustments.

## Research Purpose and Methodological Approach

This research main purpose is to apply extant research to measure the competitiveness levels of the Caribbean region known as the Greater Antilles in these times of the COVID-19. The Greater Antilles comprises five economics which are Cuba, Dominican Republic, Haiti, Jamaica, and Puerto Rico. The model to be used is the Dual Double Diamond (DDD) proposed by Cho et al. (2009) and validated by Sumah (2019) using an African country, and by Beleska-Spasova et al. (2016) that analyzed the competitive advantages of Thailand in the regional context of the Asian economy. Despite its good reputation for studying regional countries competitiveness levels, the DDD methodology has not been used in Latin American, much less in the Caribbean. The study main objective is to measure the different factors comprising the Caribbean nations competitiveness with the purpose of having validated and updated diagnostic tools, necessary to formulate strategies and achieve sustainable growth.

## Research Justification

There are two world organizations that measure countries competitiveness levels, the Institute of Management Development (IMD), and Institute for Industrial Policy Studies (IPS). Until the 2020, the World Economic Forum (WEF) also published a competitiveness index. However, none of these institutions includes all the Caribbean countries in their analysis. For instance, the IMD (2020) annual competitiveness report analyzed 63 countries, none of them in the Caribbean. For the past 5 years, the IMD has not included any Caribbean country in its annual or updated

global competitiveness reports (IMD, 2022). Until the 2014, the WEF (2019) competitiveness report included Puerto Rico in is now discontinued ranking. Cuba has never been included in this report; and the Dominican Republic, Haiti and Jamaica did appear in the 2019 WEF report. In its last report in 2020, the WEF (2023) only considered Jamaica in its competitiveness study. Furthermore, the revised IPS reports (2023) omitted all Caribbean nations. Therefore, for the Greater Antilles there is a significant lack of information on their competitiveness levels and their respective indicators.

This research aims to fill this gap. It will be the first scientifically validated research that presents a competitiveness “ranking” for the Caribbean countries, measuring the different competitiveness indicators. Achieving a regional competitiveness ranking grounded on accurate and comparative measurement of its main competitiveness indices will provide needed information to improve the use of their economic development resources.

## Research Structure

The research is organized in five parts. First, a literature review was performed to understand how the competitiveness of the Caribbean countries is measured and to describe the research conceptual framework. The second part discuss the methodology, including the sample selection, justification for the adoption of the DDD model, the process selected to calculate each country competitiveness indices, and the sources utilize to select the indicators for the different constructs. The third part examines the results found, including the physical factors and the human factors competitiveness indices using both a national and international approach. The fourth part includes the discussion of the research most important findings and the fifth part ends with research limitations and the future works that might arise from this work.

## Literature Review and Theoretical Framework

### Literature Review

To study about competitiveness, it is important to know its origins. Nations' competitiveness as a concept begins with Porter (1990); however, before there were different theoretical approaches about the wealth of nations. From the fifteenth to the eighteenth centuries, merchants and companies based wealth accumulation on their businesses' expansion to distant countries in the so-called mercantilism. Another viewpoint is the absolute advantages theory (Smith, 1776) which asserted that nations could generate wealth by exporting the goods in which they have absolute

advantages. Subsequently, in 1817, David Ricardo proposed the comparative advantages theory (Peña-Vinces, 2009) stating that countries benefited by the specialization in the production and export of those goods that they can produce more economically. Later, in 1919, Hecksher and Ohlin's formulated the factor proportions theory, which proposes that international differences in endowment factors (labor, skills, physical capital, and land) create different comparative advantages (Castro-González et al., 2017). After 1953, the growth and development study of nations incorporates new theories such as that of Linder (1961) who identified two important variables: national demand and economies of scale. Krugman (1979) and Lancaster (1979) separately developed two trade models for differentiated products. According to them, if there were economies of scale when producing a good in each country, it would be advantageous for that country to specialize in the production of said good. However, due to the changing nature of the economics world, these theories alone are not enough to explain competitiveness. To analyze competitiveness, other important variables are the globalization of markets, the growing use of information technology, knowledge management, and an environment of constant and rapid change (Peña-Vinces, 2009).

Porter (1990) proposed one of the first modern approaches to explain the competitiveness of nations, asserting that the prosperity and wealth of nations is created, and therefore not inherent, as previously thought. For Porter, wealth is not only due to each country's endogenous factors, but also depends on the capacity of its industries to innovate and update. Industries gain competitive advantages over their global competitors due to pressure and challenges, benefiting when they have strong national rivals, aggressive local suppliers, and demanding local customers (Castro-González et al., 2014). Porter theory is known as the Diamond Model or Theory of National Competitive Advantage of Industries, where competitiveness is determined by four attributes named factor conditions (FC), demand conditions (DC), related and supporting industries (RSI) and firm strategy, structure, and rivalry (FSSR). The Diamond Model postulates that a country is more competitive if these factors are strengthened. Subsequently, Cho (1994) proposed the Nine-factor Competitiveness Model (9 Factors), which considers human factors as important for the competitiveness of nations, adding five indicators: workers, politicians, national and regional governments (bureaucracy), entrepreneurs and professionals, and two external factors (chance and opportunity). Due to these models limited scope for the application to countries with export dependent economies, Moon et al. (1998) proposed the so-called Generalized Double Diamond Model (GDD), incorporating to the competitiveness definition the multinational enterprises (MNE) activities and the role played by the government.

However, these models are appropriate for the analysis of the competitiveness of countries with strong economies, with large quantities of endogenous wealth and solid firms that have production strategies at scale. The GDD and the 9 Factor models, when used alone, are of limited application for the study of small countries that have a significant dependence on the tourism industry, which is labor intensive and depends on large infrastructure investments as well as the quality of their human resources.

In contrast, Cho et al. (2009) proposed the Dual Double Diamond (DDD) theory that combines the GDD and the 9 Factors theories for measuring the competitiveness of smaller, dependent countries (Cho & Moon, 2013). The DDD model integrates theory and practice, being it useful to do new research, in new directions (Momaya, 2020); therefore, it is appropriate for researching the competitiveness of the Caribbean countries as a region. However, the competitiveness debate continued its course, as described in detail in Cho and Moon (2013) book called *From Adam Smith to Michael Porter: Evolution of Competitiveness Theory* where they analyzed the evolution of different competitiveness theories.

## Theoretical Framework

When evaluating the competitiveness of countries with high international connectivity and high dependence on the human factor, the generalized double diamond model (GDD) and the Nine-factor model (9F) have a better explanatory power than Porter's Diamond Model; even more so, in these globalized, trans-COVID-19 times where the companies that are prevailing are due to the significant levels of effectiveness and productivity that they have had managed to develop. However, in comparison, the DDD model excels in diagnosing and explaining the national and global competitiveness of nations that belongs to the same region sharing similar attributes, many of which are heterogeneous in nature. Developed by Cho et al. (2009), the DDD model relevancy arises from its unique integration of physical factors and human resources. The GDD model does not explicitly consider the role of human resources, although it is implied within both demand conditions and the factor conditions. Likewise, the 9F model considers human resources, but not those of an international nature, lacking the international focus needed to incorporate the success of companies that expand and internationalize, as well as for transnational companies (Cho et al., 2009).

In this regard, the *DDD model* represents the synchronization of the competitiveness measurement theories that currently are academically accepted; furthermore, it explicitly integrates at both the national and international level the physical and human resources. As stated by Cho et al. (2009) in this globalized area, especially due to the growing "brain

drain”, international human factors play a very relevant role, more so in these pandemic days; therefore, human factors indicators must be considered as national competitiveness’ preponderant factors.

Another justification for the international human resources factor integration into the DDD model is the so-called fourth industrial revolution with its more ubiquitous and mobile internet, smaller and more powerful sensors, artificial intelligence, and machine learning. These indicators needed to be integrated into a competitiveness model. Throughout history, revolutions that incorporate new technologies and novel ways of perceiving the world trigger profound changes in economic systems and social structures (Schwab, 2016).

The DDD theoretical framework adaptation included in this research (see Fig. 1) incorporates the DDG and the 9F competitiveness models, and given the fourth industrial revolution importance, the model is also enriched by adding a greater weight than other indicators to the factor called Related and Supporting Industries.

The competitiveness models integrated into the DDD have been validated in two studies focused on the Latin American context. Moon et al. (1998) DDG model has been validated by Peña-Vinces (2009) and Castro-González et al. (2016), and Cho (1994) 9-factor model has been validated by Díaz-Cotto et al. (2022). However, the DDD has not been validated in the Latin American context, let alone in the context of the Caribbean countries. Nonetheless, the DDD competitiveness theory is the basis for the South Korea’s Institute for Industrial Policy Studies model. This institution, in coordination with the Taylor Institute at Franklin University in Switzerland, publishes a national competitiveness

ranking that includes 62 countries in the world, none from the Caribbean region. Hence, applying this model to the study of the Caribbean is important (UNITAR, 2023).

## Sample and Methodology

### Study’s Sample

This study objective is to measure the competitiveness levels of Caribbean countries. The selected study sample is the Caribbean countries known as the Greater Antilles, geographically located in the Caribbean as a set of regional countries. These countries are Cuba, Dominican Republic, Haiti, Jamaica, and Puerto Rico, which share similar climatological conditions, customs, and idiosyncrasies. They are also at the expense of weather phenomena such as hurricanes and earthquakes due to their geographical location in the Caribbean basin. However, despite these similarities, we must bear in mind that these countries sometimes complement each other, and, in some circumstances, might even be competitors. For a Greater Antilles main characteristics brief background, see Appendix A in a separate Supplementary File.

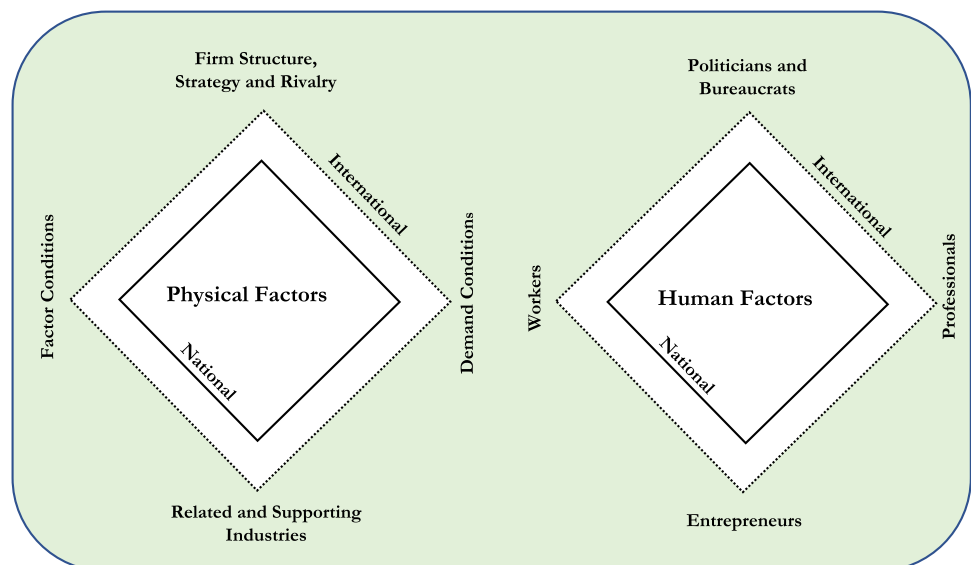
### Methodology

#### DDD Model Adaptation to the Caribbean Countries

This research has a quantitative approach, and it is a non-experimental study, which uses data from the 2016–2021 period. For each country DDD, 79 indicators were

**Fig. 1** Dual double diamond (DDD) competitiveness model. Source: Cho et al. (2009) and own elaboration

Dual Double Diamond (DDD) Competitiveness Model.



included, encompassing both physical factors and human resources, on two scenarios: national and international. All factors were validated conducting a thorough literature review that included the consultation of academic work such as the ones from Porter (1990), Moon et al. (1998), Moon and Lee (2004), Liu and Hsu (2009), Cho et al. (2009), Peña-Vinces (2009), Postelnicu and Ban (2010), Cho and Moon (2013), Castro-González et al., (2014, 2016), Cordero (2022), Díaz-Cotto et al. (2022), IMD (2022), WEF (2023), and UNITAR (2023).

The research was divided in four phases. First, indicators data collection. Due to accessibility, for each year, the data were collected for two whole semesters. 2348 data points were obtained, all from secondary sources, official governments' web pages or from international organizations. All sources are included in Tables A1 and A2 in Appendix A.

Second, for each year, each indicator weighted average was calculated, giving a greater weight to recent years to give more relevance to data points impacted by the COVID-19. The weights were: 30%, 25%, 20%, 15%, 5% and 5% for the years 2021, 2020, 2019, 2018, 2017 and 2016, respectively. The data were homogenized to have a reasonable range and avoid any distortion. For instance, variables such as GDP were measured in billions of dollars, and birth rate growth was measured as a percentage.

Third, using Eq. (1) in an Excel spreadsheet (2019 version), competitiveness indices were calculated for each indicator, for each country applying it to each DDD model's constructs or pillars, for the national and international physical factors and human resources competitiveness indices. This equation has been validated by several investigations, including Peña-Vinces (2009), Liu and Hsu (2009), Postelnicu and Ban (2010) and Castro-González et al. (2014):

$$IC_{iP} = W_i \times 100 \times \frac{P_{iP}}{\max P_{iP}} \quad (1)$$

where  $IC_{iP}$  is the competitiveness index of indicator  $i$  for country  $P$ .  $W_i$  is the proportional weight according to each factor indicators' number.  $P_{iP}$  is the weighted average of indicator  $i$  for country  $P$ .  $\max P_{iP}$  is the maximum weighted average for the five countries in the study.

Finally, as stated by the DDD model, competitiveness indices were calculated for the national and international physical and human resources factors, and then they were added. The combined values range from 0 to 100, where 0 indicates a poor competitiveness level and 100 an ideal level of competitiveness.

**Indicators Employ to Calculate Physical Factors' Competitiveness** As stated by the DDD model, the indicators were

categorized into four factors: Factor Conditions (FC), Related and Supporting Industries (RSI), Demand Conditions (CD) and Firm Structure, Strategy, and Rivalry (FSSR). In turn, each factor was studied at both the national and international levels. A total of 43 indicators were used, 24 to calculate national competitiveness and 19 to calculate the international one. A complete list of all indicators with their corresponding sources is shown in Table A1, included as an Appendix in a separate Supplementary File.

**Indicators Employ to Calculate Human Resources' Competitiveness** To analyze human resources' competitiveness, the indicators were divided into four factors, Politicians and Bureaucrats (PB), Workers (W), Entrepreneurs (E) and Professionals (P), both measured at the national and international level. A total of 36 indicators were used, 16 to calculate national competitiveness and 18 to calculate the international one. A complete list of all indicators with their corresponding source is shown in Table A2 (see Appendix file).

## Analysis and Results

### Caribbean Countries Physical Factors' Competitiveness

#### National Physical Factors Competitiveness

The competitiveness indices for each national physical factors' indicator, as well as the total for each factor, were obtained applying the previously shown Eq. 1. The results are included in Table A3, as exhibited in Appendix A in a separate Supplementary File.

According to Table A3, for the National Factor Conditions (FC-N), the country with the best competitiveness level is CU with a 90.35 score, then HI with a 90.35 value, and the least competitive is PR with a 59.52 count. According to Adam Smith's theory, the FC-N construct represents endogenous wealth such as farmland, arable land, total population, among others. These indicators are known as comparative advantages that, if they are not worked on and maximized, cannot be converted into competitive advantages (Castro-González et al., 2014).

For the National Related and Supporting Industries (RSI-N) factor, DR is the most competitive with a 79.20 score, followed by PR with 79.12 points, and lastly HI with a 46.29 value. For the National Demand Conditions (DC-N) factor, DR came first with 66.07 points, then PR with 49.45, and the least competitive is CU with a 45.38 score. For the Firm Structure, Strategy, and National Rivalry (FSSR-N), JA with

82.88 is the most competitive, second PR with a 71.83 value and, the least competitive CU with 45.75.

Figure A, as shown in Appendix A, displays each factor total expressed as diamond areas. As aforementioned, the diamond concept was developed by Porter (1990), and it allows the visualization of each country competitiveness level by comparing the sizes of their diamond areas. For the national physical factor, Figure A demonstrates that DR is the most competitive with a 72.67 score, second PR with a 64.98 value, third CU with a 63.68, then JA with a 60.83 score, and lastly HI with a 60.55 value.

### International Physical Factors Competitiveness

Using Eq. 1, Table A4, as shown in Appendix A, exhibits the International Physical Factors competitiveness indices as well as the total for each factor. The results indicate that for the International Factor Conditions (FC-I) PR is the most competitive with a 90.00 score, followed by DR with a 77.96 value, and the least competitive is HI with a 21.10 value. These indicators are known as sophisticated comparative advantages (Moon et al., 1998).

For the International Related and Supporting Industries factor (RSI-I), Table A4, point to DR as most competitive with an 82.64 value, followed by JA with 67.47 points, and in last place HI with a very low score of 11.44. For the International Demand Conditions (DC-I) factor, the most favored is PR with an 81.93 score, then DR with a much lower 44.99 points, and the least competitive CU, with an extreme low score of 8.83. Last, for the Firm Structure, Strategy, and International Rivalry (FSSR-I), PR with 65.67 value is highest in the ranking, followed by JA with a 56.98 score, and in last place CU with 29.37 points.

In Appendix A, Figure A2 displays the International Physical Factors total expressed as diamond areas. PR's diamond is the biggest with a 75.70 value, followed by DR with 62.52 points, JA with a 54.27 score, then, with considerably lower numbers, CU with 29.65 points, and HI with a value of only 29.20.

### Caribbean Countries' Human Resources Competitiveness

#### National Human Resources Competitiveness

Using Eq. 1, Table A5, as shown in Appendix A, displays the calculated competitiveness indices for each national human resources indicators, and each factor total. From the values in Table A5, for the National Politicians and Bureaucrats (PB-N) factor, PR is the most competitive with an 82.72 score, then CU with a 65.31 value, and the least competitive is HI with a 40.38 count. For the National Workers (T-N) factor, the best is CU with a high score of 95.38, followed

by PR with an 84.97 value, and the least favored is HI with a 60.17 score. For the National Entrepreneurs (E-N) factor, the most favored is JA with a 74.07 value, then PR with 70.26 points, and the last is HI with only a 39.89 score. For the National Professionals (P-N) factor, PR came first with an 86.89 score, followed by DR with a 78.37 value, and last HI with a 40.25 score. In Appendix A, Figure A3, displays each factor total expressed as diamond areas, having PR the biggest diamond with an 81.21 value, then CU with a 75.38 score, DR with 68.57 points, JA with a 66.02 value, and, finally, HI with a 45.17 score.

### International Human Resources' Competitiveness

Table A6, included in Appendix A, exhibits the average value for the weighted and standardized indices associated to the factors forming the international human resources dimension: International Politicians and Bureaucrats (PB-I), International Workers (W-I), International Entrepreneurs (E-I), and International Professionals (P-I).

For the International Politicians and Bureaucrats (PB-I) factor, the most competitive is JA with a 76.66 score, followed by PR with a 72.31 value, and the least competitive is HI with 48.59 points. For International Workers (W-I), CU arrived first with a 74.01 score, second PR with a 69.99 value, and the least favored is HI with a score of just 28.00. For the International Entrepreneurs (E-I) factor, DR with a 66.31 score is the most favored, followed by JA with a 64.43 value, and lastly CU with a low score of 19.13. Conversely, on the International Professionals (P-I) factor, CU came first with an 87.14 score, followed by PR with a 68.13 value, and lastly JA with 37.41 points. In Appendix A, Figure A4, PR has the biggest diamond with a 65.43 score, then CU with a 61.56 value, JA with a 57.37 score, RD with 57.03 points, and last HI with a 38.72 value.

### Caribbean Countries Competitiveness Ranking by Factors

Table 1 details each country competitiveness levels breakdown by the factors that make up the DDD model, and Fig. 2 also displays the rankings but expressed as diamond areas. For all factors, Table 1 shows that CU has the two lowest scores, DC-I with an 8.83 value and FSSR-I with 11.44 points. In both cases, the factors are within the International Physical Factors construct. However, CU also achieved the two highest levels of all factors (W-N with a 95.38 score and CF-N with a 90.35 value). Meanwhile, Fig. 2 exhibits PR as achieving the largest diamonds areas, obtaining the best values in three of the four corners of the diamond (PF-N, HR-N, and HR-I), being only surpassed by DR in the PF-N factor corner.

**Table 1** Overall competitiveness levels using the DDD model

	Factor	HI	RD	PR	CU	JA
National physical factors	FC-N	90.23	81.46	59.52	90.35	61.80
	RSI-N	46.29	79.20	79.12	73.22	51.75
	DC-N	59.35	66.07	49.45	45.38	46.90
	FSSR-N	46.33	63.92	71.83	45.75	82.88
	Total PF-N	60.55	72.67	64.98	63.68	60.83
International physical factors	FC-I	21.10	77.96	90.00	61.59	48.64
	RSI-I	11.44	82.64	65.11	18.82	67.47
	DC-I	32.28	44.99	81.93	8.83	44.01
	FSSR-I	51.99	44.50	65.77	29.37	56.98
	Total PF-I	29.20	62.52	75.70	29.65	54.27
Total physical factors		<b>43.80</b>	<b>68.66</b>	<b>69.42</b>	<b>45.80</b>	<b>58.63</b>
National human resources	PB-N	40.38	46.07	82.72	65.31	43.52
	W-N	60.17	83.08	84.97	95.38	80.56
	E-N	39.89	66.78	70.26	72.56	74.07
	P-N	40.25	78.37	86.89	68.29	65.91
	Total HR-N	45.17	68.57	81.21	75.38	66.02
International human resources	PB-I	48.59	57.12	72.31	65.95	76.66
	W-I	28.00	51.88	69.99	74.01	50.98
	E-I	32.20	66.31	51.29	19.13	64.43
	P-I	46.09	52.83	68.13	87.14	37.41
	Total HR-I	38.72	57.03	65.43	61.56	57.37
Total human resources		<b>41.95</b>	<b>62.80</b>	<b>73.32</b>	<b>68.47</b>	<b>61.69</b>
Overall level		<b>43.41</b>	<b>65.20</b>	<b>71.83</b>	<b>57.57</b>	<b>59.62</b>

Bold mean the total competitiveness indices of both physical factors and human resources calculated for each country

## Global Competitiveness Ranking

For each of the Greater Antilles, overall competitiveness ranking was calculated applying to the values in Table 1; the following formula was validated by the work of Peña-Vinces (2009) and Díaz-Cotto et al. (2022):

$$\text{Total for Ranking}_{\text{DR}} = \text{Average}(\text{Total}_{\text{FF-N}} + \text{Total}_{\text{FF-I}} + \text{Total}_{\text{RH-N}} + \text{Total}_{\text{RH-I}}). \quad (2)$$

For example, for the Dominican Republic, the score is calculated as follows:

$$\begin{aligned} \text{Total for Ranking}_{\text{DR}} &= \text{Average}(72.67 + 62.52 + 68.57 + 57.03) \\ &= 65.20. \end{aligned}$$

For all countries, Table 2 displays the competitiveness ranking. PR occupies the first position with a 71.83 overall score, while Haiti came last with a total 42.87 points.

**Table 2** Caribbean countries competitiveness ranking

Position	Country	Score
1	Puerto Rico (PR)	71.83
2	Dominican Republic (DR)	65.20
3	Jamaica (JA)	59.62
4	Cuba (CU)	57.57
5	Haiti (HI)	43.41

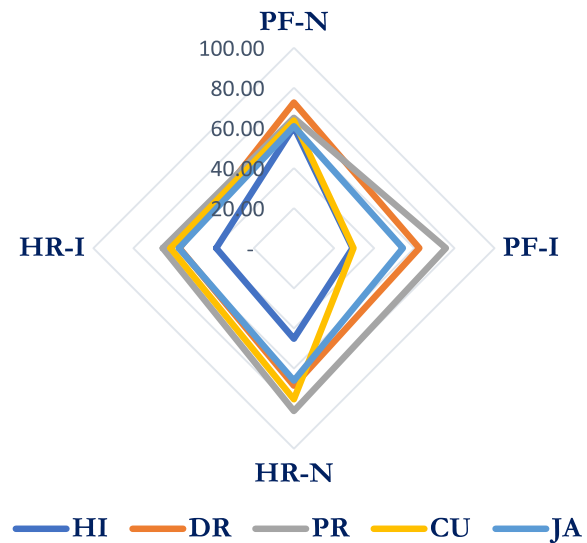
## Discussion

Grounded on the scientifically validated Dual Double Diamond Model (DDD), this research presents a landmark competitiveness ranking for the Caribbean grouped as regional countries. Neither previous academic research investigates the region competitiveness, nor it is included as part of the competitiveness evaluation of organizations such as the IMD (2020). The factors that comprise the ranking allows for the identification of strengths and weaknesses influencing each country economic development.

Overall, the DDD model indicates that Puerto Rico is the most competitive country when compared with the other

**Fig. 2** Overall competitiveness levels using the DDD model. Own elaboration

Overall Competitiveness Levels Using the DDD Model. Own elaboration.



Greater Antilles, but DR's National Physical Factors diamond is larger than that of PR, implying that DR is more competitive than PR if only the National Physical Factors indicators were considered. For the other constructs, PR's diamonds are the largest. Furthermore, if the national and international factors were combined, PR continues to be the most competitive country in the analyzed Caribbean region.

## Practical Implications and Future Studies

Drawing on extant empirical research, this study pioneers the DDD model application to the Caribbean as a region. The DDD model not only assesses regional competitiveness levels, but also allows to perform comparative analysis identifying factor by factor the indicators in which each country has a comparative better performance versus the ones that needs most improvement. The assessment, for example, might be used to direct public policies focus on the direction of reinforcing or maintaining the factors that perform best and improving those that do not, making the country more competitive and attractive for foreign direct investment (Castro-González et al., 2014). In addition, it might serve as guide for governments to improve their competitiveness levels since, for example, periodically, the countries would replicate this research to measure the achievement of their competitiveness strategies.

However, it is important to highlight the analysis limitations. The factors weights were placed proportionally to the number of indicators per factor. This requires further analysis that uses advanced statistical techniques for weights assignments. Index development is quite challenging since there is very little data availability on certain factors, which

can generate another limitation. International prestige institutions such as the Institute of Management and Development (IMD), Institute for Industrial Policy Studies (IPS), and, in its time, the World Economic Forum (WEF), do not include in their research all Caribbean countries, so most of the information analyzed has been obtained from different international organizations. The methodology must be further validated by conducting other comparative analysis where different regional economies are studied.

## Key Questions Reflecting Applicability in Real Life

1. How could industrial/commercial organizations identify the factors or indicators in which they should most contribute to further their country competitiveness level?
2. How could the government balance satisfying their citizen immediate needs and prioritize public investment in the areas identify in the model as having the most impact on the country competitiveness level?
3. Where will international investors find comparative data on the Caribbean countries demand conditions?
4. Which are the key demand and physical factors indicators that researchers should focus on to further the study of the Caribbean country's competitiveness levels?
5. Which are the key negative indicators in each country that public policy implementers should prioritize to make assertive decisions?

**Supplementary Information** The online version contains supplementary material available at <https://doi.org/10.1007/s42943-023-00089-9>.



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**Data Availability** All data were obtained from publicly available sources.

## Declarations

**Conflict of Interest** On behalf of all the authors, the corresponding author states that there is no conflict of interest. The authors have no relevant financial or non-financial interests to disclose.

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