

International Innovation Management

Assignment 2 – International Operations

MSc International Innovation Management

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Future Manufacturing Locations & Innovation Management Standards

A Report and Recommendations prepared for

Ongaisation X

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0.1	Chris Probert	07-01-2022	First Draft
0.2	Chris Probert	28-01-2022	Minor amendments and additions.
1.0	Chris Probert	04-02-2022	1 st approved version for client review (MS 1).

Executive Summary

This report provides the data and rationale for the recommendation of the most suitable locations from the shortlists provided.

Following an extensive review of city, regional and national data and looking at the merits and risks presented by each of the 9 locations specific to our industry sector, the recommendations are:

For the **Americas**, the recommendation is **Chihuahua, Mexico**.

For **Asia**, the recommendation is **Visakhapatnam, India**.

For **Africa**, the recommendation is **Tunis, Tunisia**.

The report concludes with a section on **innovation management standards** that would support the growth of the company with a new distributed manufacturing footprint.



Introduction

The study work has included a wide ranging review of the following factors using a diverse set of data and information from a number of sources. The suitability of the locations for the purposes of product manufacturing and distribution has been prioritised. The analysis has been structured around an extended and focused version of a **PESTLE** analysis:

Political - including the national, regional and local government support for inward investment, the current state of policies relating to taxation, tariffs, local content and other key factors that apply to foreign-owned manufacturing facilities.

Economic – Levels of income and cost of living. Inflation, interest and employment rates. Currency fluctuations.

Social – The cultural aspects and demographics that are pertinent to the operation of a regional manufacturing centre. (Including Languages, educational attainment, healthcare provisions).

Manufacturing Technology - Maturity of the local ecosystems for the needed skills, digital infrastructure, physical infrastructure (land/buildings, local transport networks, energy and water) and the accessibility of relevant support service providers for our proposed manufacturing technologies.

Logistics - Inbound and outbound supply chains. Business travel times.

Legal - National and regional laws that have a direct impact on the ability to operate a flexible and agile manufacturing plant. Including but not limited to – corruption, anti-corruption, law enforcement, employee rights, employer obligations.

Environmental – The likely carbon footprint of Organisation X's facilities (Scope 1 emissions) in each of the options, the availability of renewable energy for the area (a significant part of the scope 2 emissions) and other factors contributing to Scope 2 and 3 emissions. Our environmental considerations also include an analysis of the data and trends for disruptions due to extreme weather events as a result of climate change such as extreme heat waves, flood, wild fires, power outages, storms force winds, water quality and availability.

Statement of Requirements

The following requirements for inclusion in the report were set out:

1. Identify a set of credible and **comparable country level indexes** and rankings that cover the factors set out.
2. Identify and evaluate the **city and regional economic development offerings** towards foreign direct investment projects of this nature - should such proposition material exist.

For **item 1**, The Economist Intelligence Unit's (EIU) datasets were selected to provide the overarching comparator data. (The Economist Intelligence Unit, 2022). The Definition for their Business Environment Ranking is:

The business rankings model measures the quality or attractiveness of the business environment in the 82 countries covered by The Economist Intelligence Unit's Country Forecast reports. It examines ten separate criteria or categories, covering the political environment, the macroeconomic environment, market opportunities, policy towards free enterprise and competition, policy towards foreign investment, foreign trade and exchange controls, taxes, financing, the labour market and infrastructure.

(Banco Santander, 2022)

The World Bank's Doing Business reports (World Bank Group, 2021) have also been used for additional comparisons as the EIU does not report a Business Environment Rank for Uruguay or Zimbabwe. Note that due to reported data irregularities the EIU data has been given primacy.

The World Intellectual Property Organization's Global Innovation Index (WIPO, 2021) has also been used.

For **natural and climate change risk comparisons**, the GFDRR's Think Hazard data sets have been used. (Global Facility for Disaster Reduction and Recovery, 2022).

For the specific topic of **corruption**, Transparency International's metrics (Transparency International, 2022) have been included to augment the commentary provided by the EIU. This has been done due to the disparity in the sophistication and level of corruption in some of the shortlisted countries when compared with the UK.

For **item 2**, each location-specific section of the report will include a link or links to the relevant web pages of content when available. As these are primarily self-published promotional websites, they tend not to provide objective comparator data and hence the use of the item 1 data sources in this study.

South America / The Americas

With over 1 billion citizens, The Americas region has some of the biggest markets in the world. North America has the highest wealth of any region and the United States alone accounted for 30% of the world's wealth in 2020. (Credit Suisse Research Institute, 2021, p. 130).

Mexico - Chihuahua

Whilst not actually in South America, Mexico is well placed to serve markets in North, Central and South America.

With regard to market opportunities and supply chain friction when looking at North America, Mexico has the advantage over the other shortlisted countries in the region by being part of [USMCA](#) (United States – Mexico – Canada Agreement), the 2020 update of the long established [NAFTA](#) (North American Free Trade Agreement). Both inbound and outbound logistics with both the United States and Canada benefit from these agreements when compared to other countries in The Americas.

Mexico is significantly closer to key locations in the USA; Chihuahua City is 655 miles from Houston Texas (800 miles or 13 hours by road) compared to a straight-line distance of over 5,000 miles from Montevideo and 4,900 miles from São Paulo.



Mexico has been the choice of many international OEM and Tier 1 electronics manufacturers for several decades. For example, Chihuahua is the home to [SMTC's largest manufacturing facility](#) so the area and the surrounding communities already have much of the infrastructure and many of the

technical skills needed to manage the manufacture and supply chain for high quality electronic devices.

Chihuahua's Economic Development Corporation, [Chihuahua Global](#), promote themselves as “Your gateway to North America” and makes a compelling location argument for several industries including electronics and medical devices.

Chihuahua City Itself has its own inward investment support and promotion agency in addition to that of the Chihuahua State. International companies including Heineken, Ford and aerospace company Safran all have a manufacturing presence in the city. See [Chihuahua City Invest](#). Chihuahua City's population is 3.7M and has its own International Airport.

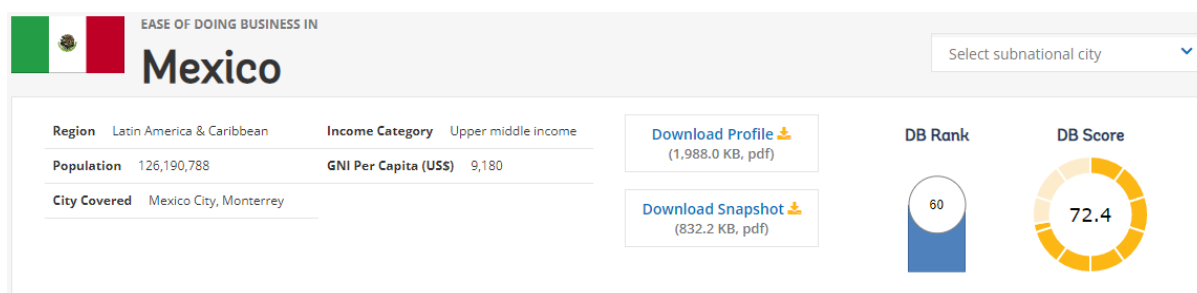
To conclude the summary for Chihuahua, the international comparator data for **Mexico** is provided below:

The EIU's Business Environment score (2016-20) for **Mexico** is:

Score: **6.34** / 10

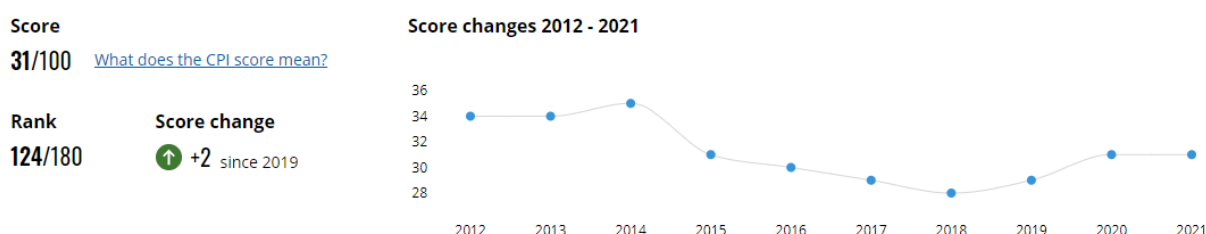
World Rank **41/82**

For comparison, the World Bank's Doing Business (DB) rank is **60** out of the 190 countries analysed:



Source: www.doingbusiness.org

Of the shortlisted locations in The Americas, Mexico has the least favourable ranking when it comes to corruption (Transparency International, 2022):



Source: Transparency International

Because of this, it is recommended that any expatriate staff spending time in Mexico receive specific anti-corruption training.

Chihuahua has 5 level “High” hazards in the GFDRR data: river and urban flood, Cyclone, extreme heat and wildfire.

Uruguay - Montevideo

Uruguay's recent performance in attracting FDI (Foreign Direct Investment) has been impressive; in 2020 inflows increase 43% when compared with 2019 and the highest since 2012. (United Nations, 2021, p.60). Of the three shortlisted countries in the region, it was the only one not to suffer a year-on-year decline (Mexico -15%, Brazil -62%).



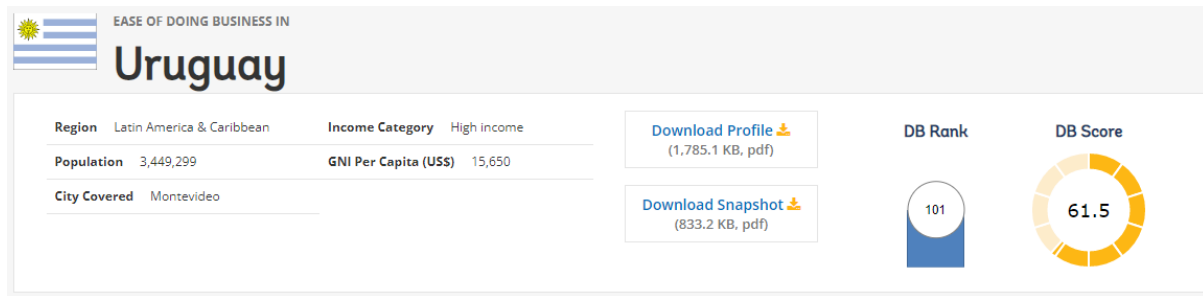
The country's dynamic technology industry and the growth in the number of tax breaks for eligible FDI projects is cited as a primary reason for the inflows. (Crédit Agricole Group, 2022).

Uruguay has a national investment promotion and support agency – [Uruguay XXI](#) however a review of the agency's focus areas suggest it is weak when it comes to electronics manufacture.

Montevideo is home to several universities and the University of Montevideo is ranked as the number 1 university in Uruguay. Other larger universities in the city also deliver engineering and science programmes so the region has a strong graduate level skills pipeline.

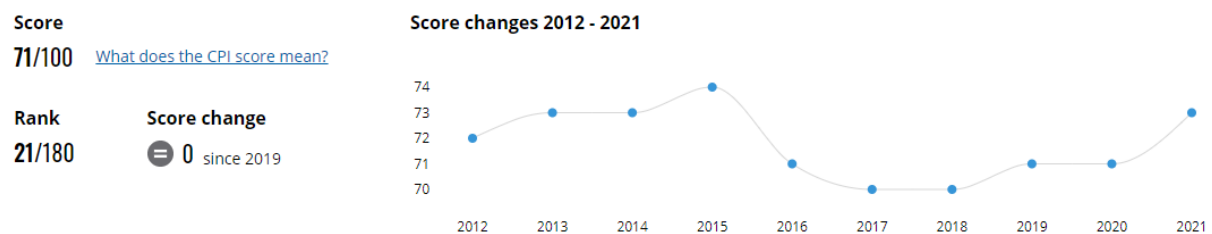
The EIU does not report a Business Environment score. Uruguay XXI's own website states that Uruguay is ranked #1 Latin America for low corruption, social mobility, inclusive development, rule of law and democracy.

The World Bank's global Doing Business (DB) ranking for Uruguay is **101** out of 190:



Source: www.doingbusiness.org

Of the shortlisted locations in The Americas, Uruguay has the most favourable ranking when it comes to corruption (Transparency International, 2022):



Source: Transparency International

The GFDRR risk are high for 3 categories: river flood, coastal flood and wildfires.

In concluding, the lower national World Bank ranking, the smaller size of the labour pool (population of Montevideo 1.3M) and the distance from the major markets when compared with Chihuahua (population 3.7M) makes it a less attractive option.

Brazil – São Paulo

For servicing the more populous South American countries, São Paulo has a good location in terms of proximity. Given that the population of Brazil (212 million) accounts for approximately 50% of the total South American population of 430 million, São Paulo offers a distinct advantage in terms of proximity to domestic centres of population and local markets.



São Paulo is home to numerous [research institutes](#) and while many are focused on agricultural, biological and earth sciences there are many that focus on healthcare and engineering which offer good potential for local collaborations. It is also home to many [universities and technical](#) colleges including the University of Sao Paulo, one of the highest ranked university in Latin America (QS Quacquarelli Symonds, 2022) (Times Higher Education, 2022).

The World Bank's Doing Business dataset provides city level ranking benchmarking in which São Paulo is ranked #1 in Brazil.


EASE OF DOING BUSINESS IN

São Paulo - Brazil

Region	Latin America & Caribbean	Income Category	Upper middle income
Population	209,469,333	GNI Per Capita (US\$)	9,140

[Download Profile](#)

(1,488.3 KB, pdf)

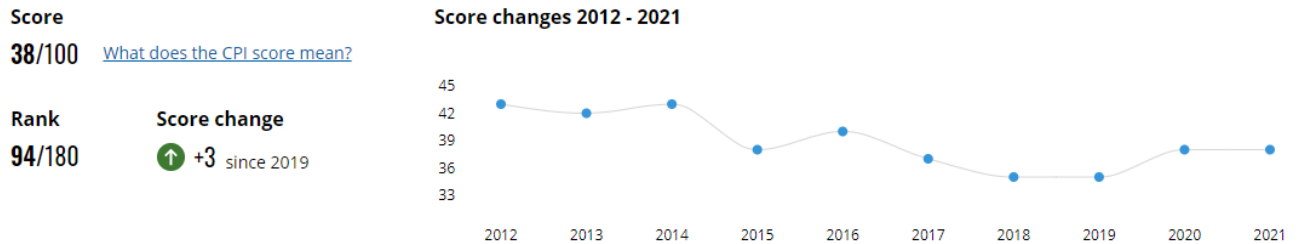
This page summarizes *Subnational Doing Business in Brazil 2021* data for São Paulo. The first table shows its rank among 27 locations in Brazil. The rest of the tables summarize the key indicators for each topic and benchmark against regional (EAP) and high-income economy (OECD) averages.

Source: www.doingbusiness.org

The Brazilian Government's trade and investment promotion agency is [Apex Brazil](#). The state of São Paulo also has its own agency, [InvestSP](#).

Although São Paulo does not enjoy the same Free Trade Zone status as Manaus in the north, it is home to many large consumer electronics companies. Brazil's high taxes on imports has resulted in many locating manufacturing plants in the area with a focus on serving domestic markets with limited export activity (TechinBrazil, 2015).

As a county, Brazil has a corruption ranking between those of Mexico and Uruguay:



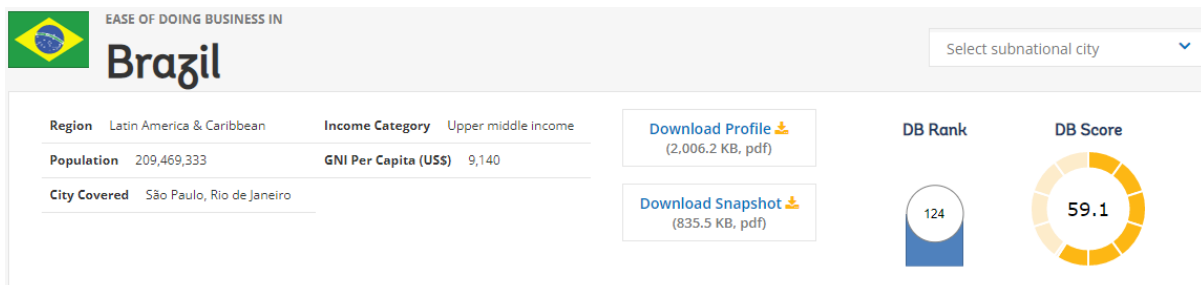
Source: Transparency International

The EIU's Business Environment score (2016-20) for **Brazil** is:

Score: **5.73** / 10

World Rank **52/82**

Brazil's Word Bank DB Rank is the lowest of the 3 shortlist countries:



Source: www.doingbusiness.org

São Paulo's has 5 GFDRR high hazard levels; river, urban, and coastal flooding, extreme heat and wildfire.

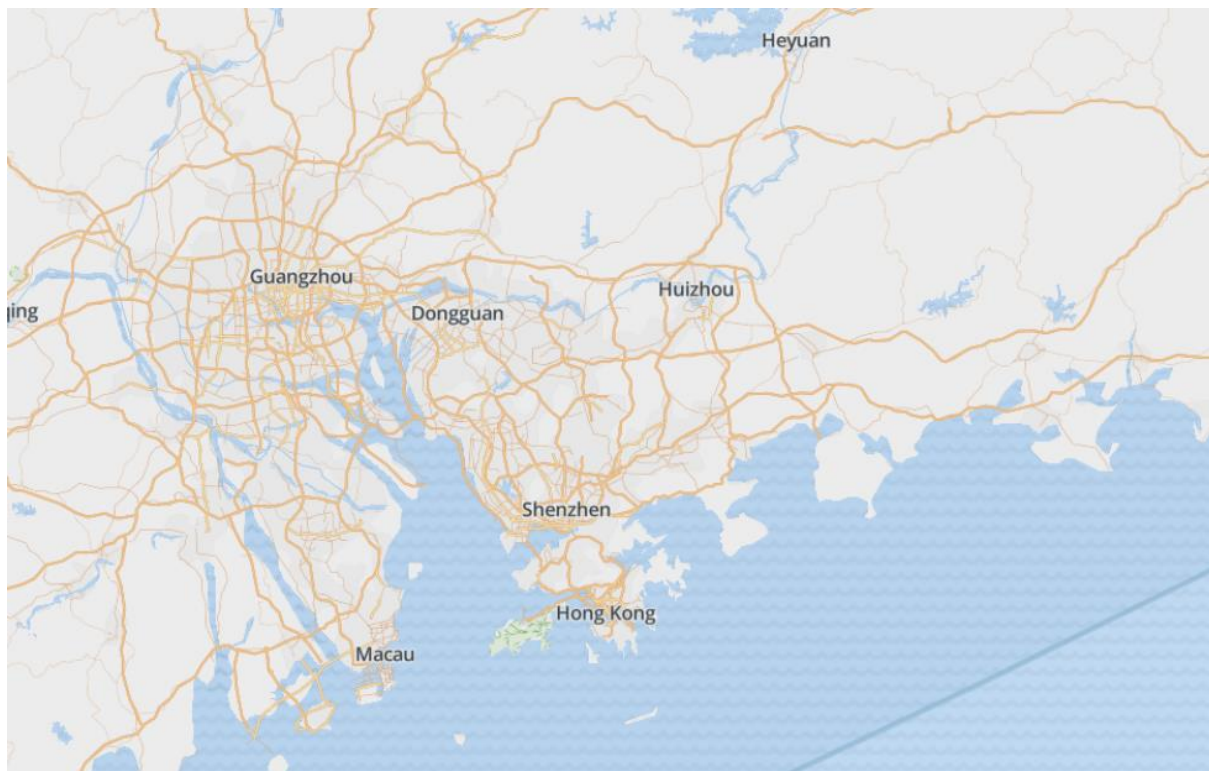
Whilst São Paulo offers the infrastructure and skills needed – and would provide great margins from sales in Brazil – the market access benefits offered by Chihuahua to the larger North America market mean that São Paulo is deselected at this stage.

Asia

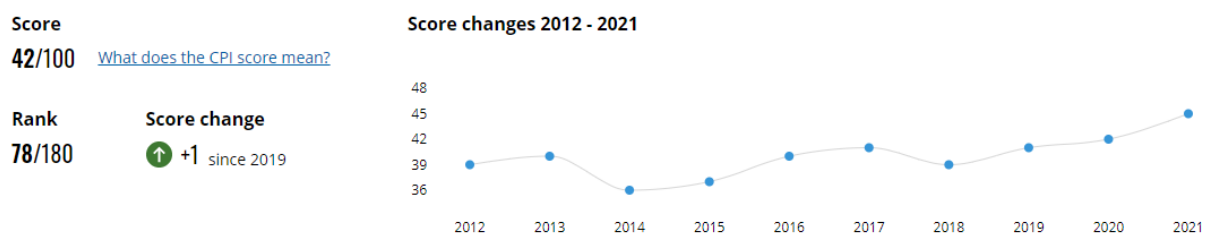
With 4.5 billion people, approximately 60% of the world's population, the region has many of the biggest and fastest growing economies. The shortlist for Asia contains 2 traditional powerhouses of global electronics manufacturing in Shenzhen, China and Taipei in Taiwan. In Visakhapatnam, we have one of the fastest growing tech hubs in India - the fastest growing large economy in the world.

China – Shenzhen

The city of Shenzhen is widely acknowledged as one of the world's largest electronics manufacturing areas and is surrounded by and in close proximity to significant supply chain companies and infrastructure. Its attraction is only strengthened by its status as Special Economic Zone (SEZ).



Of the Asia options, China sits behind Taiwan but ahead of India in the corruption benchmark. (Transparency International, 2022):



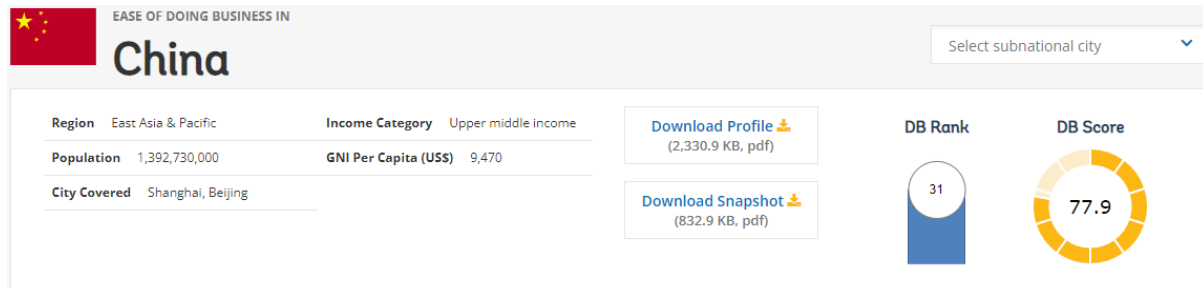
Source: Transparency International

The EIU's Business Environment score (2016-20) for **China** is:

Score: **5.62** / 10

World Rank **56/82**

China's rank in the World Bank DB measure is 31. Lower than Taiwan at 15 but significantly higher than that for India.



Source: www.doingbusiness.org

Shenzhen has its own [commerce bureau](#) and as part of the wider Shenzhen-Hong Kong–Guangzhou cluster, is ranked #2 globally for science & technology clusters (WIPO, 2021, p.7)

Shenzhen has 5 GFDRR high hazard levels; urban flood, coastal flood, cyclone, extreme heat and wildfire. It also has a medium rating for water scarcity - something the International Water Association (2022) has highlighted as a growing issue - but the city has mitigation plans in place.

India – Visakhapatnam

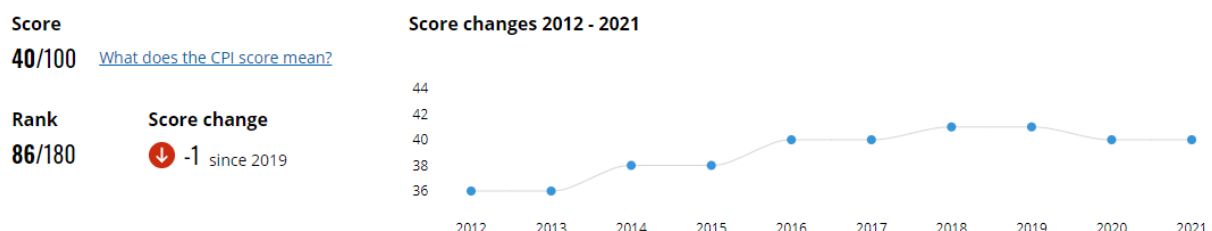
Visakhapatnam is one of the high growth tech sector locations in the state of Andhra Pradesh. Electronics manufacture is cited as a key sector and home to many well know companies such as Foxconn and Xiaomi.

The state has a higher growth rate than the national average. Visakhapatnam is the largest city in the state with a population of over 2M. The state (population 49.4M) has 21 state Universities, 535 industrial training institutes, 479 engineering colleges and 314 polytechnic institutes.



As a regional manufacturing location with a high proportion of exports, the Indian Government's scheme for bonded manufacturing provides significant advantages for manufacturers – particularly those with high value imported components. (Invest India, 2022).

India has the worst corruption ranking in our Asia shortlist:

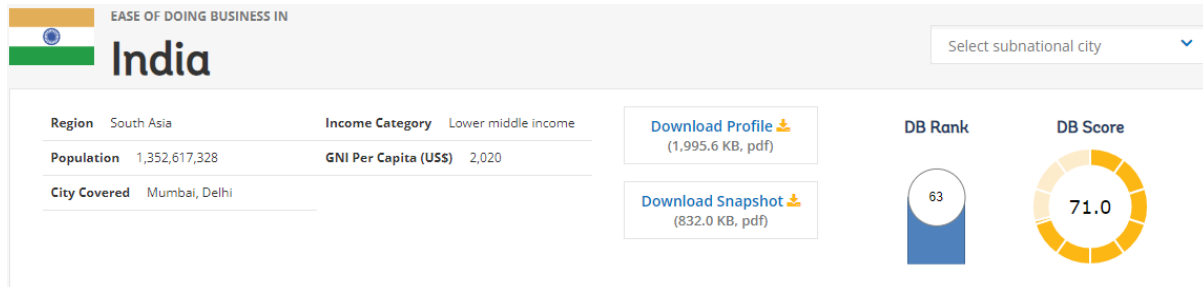


The EIU's Business Environment score (2016-20) for **India** is:

Score: **5.12** / 10

World Rank **65/82**

With India's DB ranking of 63, it is noteworthy to see the state of Andhra Pradesh ranked as #1 in ease of doing business in the national [Invest India](#) data.

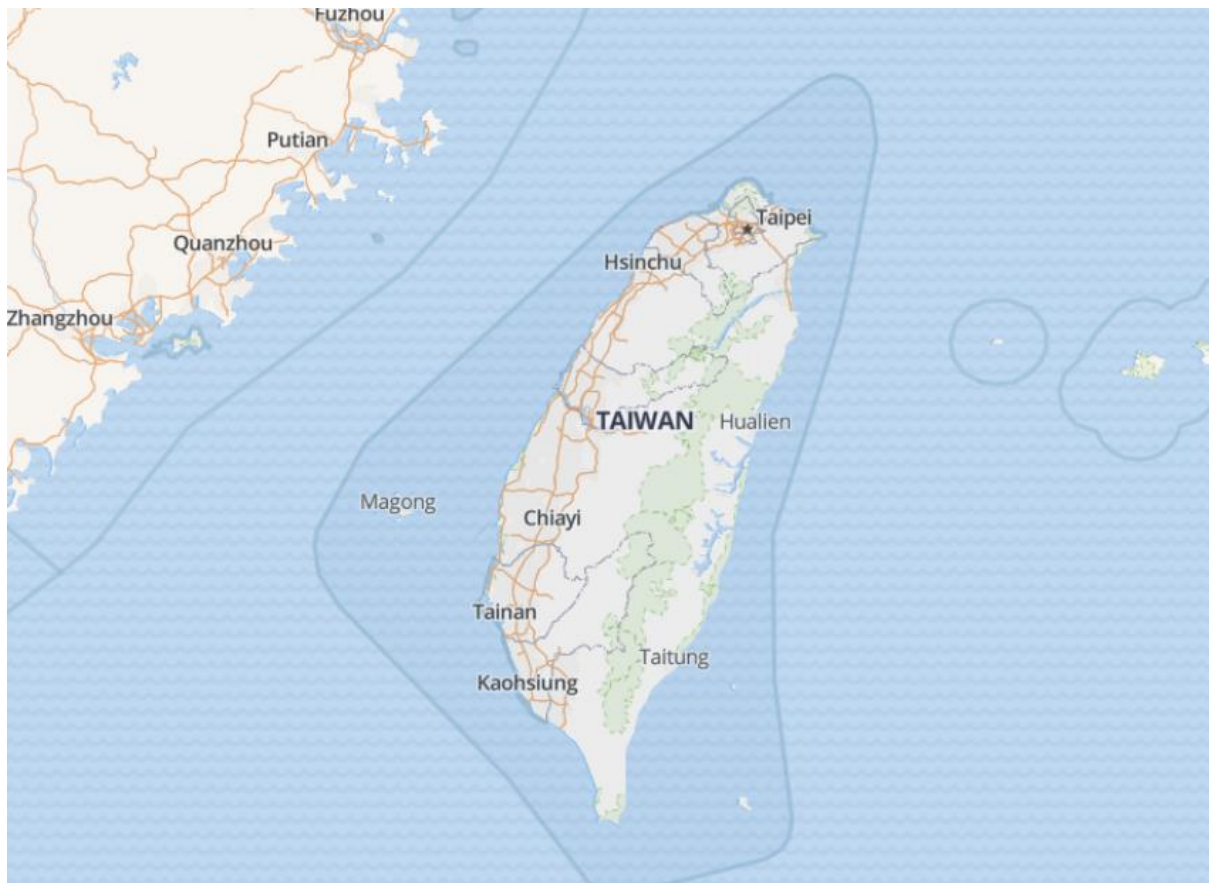


With continuing wage inflation in China and the high cost of labour in Taipei, Visakhapatnam with its impressive skills infrastructure, the bonded manufacturing offer, and the arrival already of Foxconn and Xiaomi makes it the recommendation for the Asia region.

Taiwan – Taipei

Taiwan is the only shortlisted country in the World Bank’s income category of “High income”. This is a significant consideration when looking at the operating costs for any proposed facility.

Taiwan accounts for 70% of the global share of semiconductor wafer production and about 50% of IC packaging. Taipei is the home to nearly 70% of the foreign owned companies in the country (Invest.Taipei, 2022).

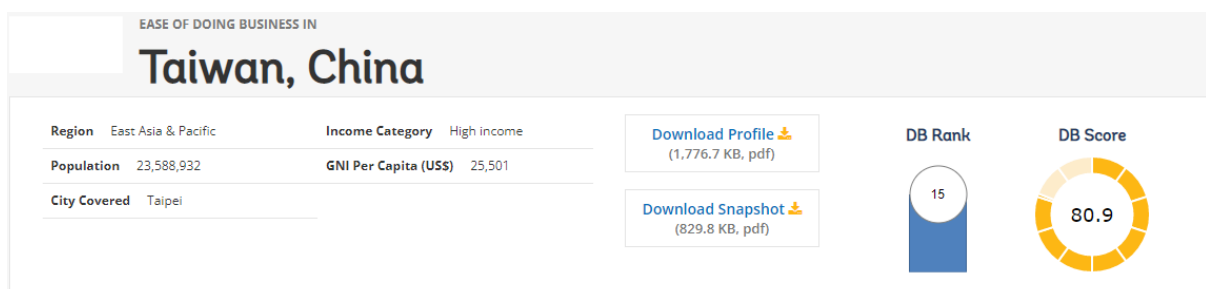


The EIU’s Business Environment score (2016-20) for **Taiwan** is:

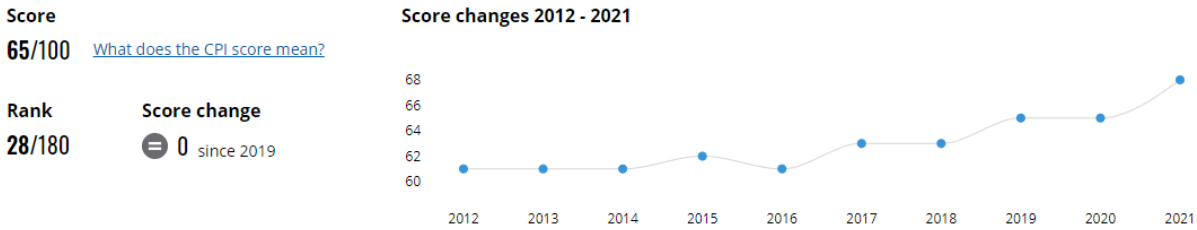
Score: **7.58** / 10

World Rank **18/82**

The World Bank’s DB rating is the best of all 9 shortlisted countries:



Taiwan ranks the least corrupt ranking of the Asia shortlist:



Taipei’s time difference is GMT+8 making it the most out of sync with UK time.

Africa

Africa's industrial development and manufacturing output have been disappointing for over 4 decades. "Africa's share of global manufacturing has fallen from about 3% in 1970 to less than 2% in 2013" (World Economic Forum, 2017). Amongst the shortlist for Africa are locations making concerted efforts to create conditions conducive to inward investment.

South Africa - Durban

[Invest Durban](#), the city's investment promotion authority, do not have a sector proposition for electronics manufacturers so any effort to establish a manufacturing presence will likely be more difficult.

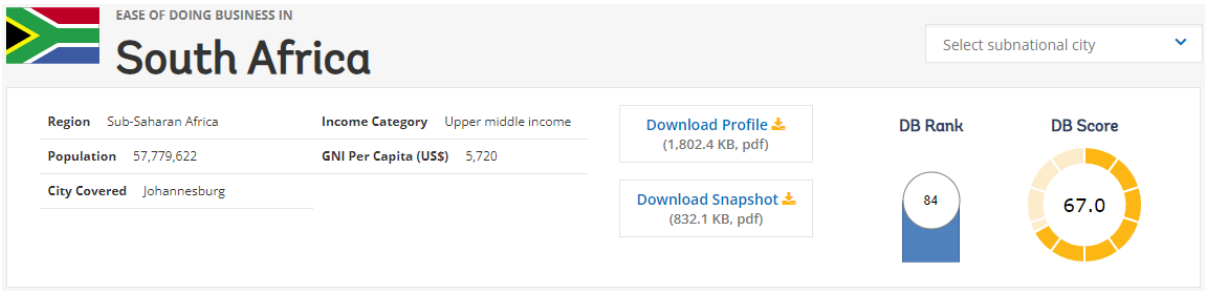


The EIU's Business Environment score (2016-20) **South Africa** is:

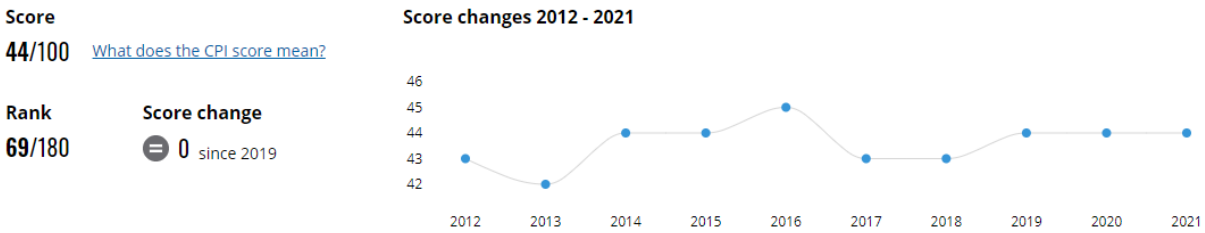
Score: **5.82** / 10

World Rank **51/82**

The World Bank rank is 84:



South Africa’s corruption rank is equal to that of Tunisia:



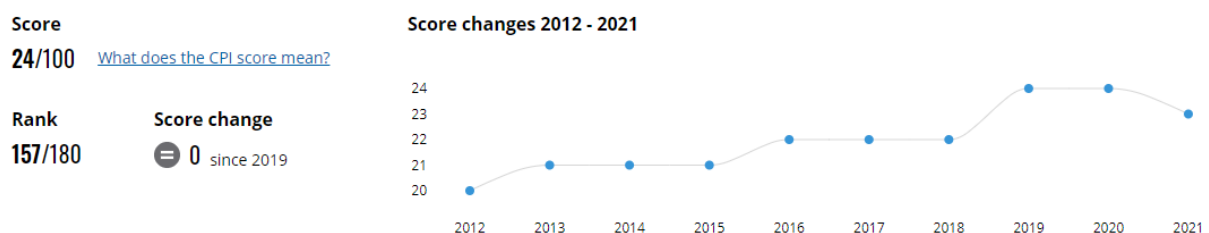
GFDRR does not report at the city level for Durban, The county level data has 4 high and 5 medium hazard rankings.

Zimbabwe – Bulawayo

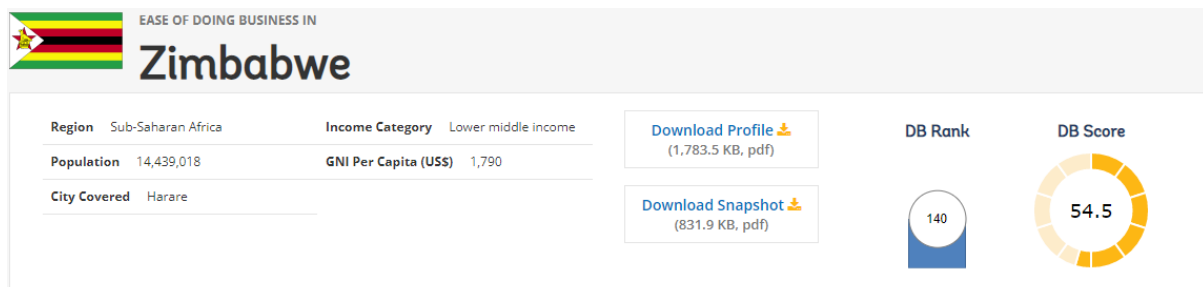
[ZIDA](#), the Zimbabwe Investment & Development Agency was established in February 2020 and consolidated many agencies that fragmented and frustrated the process of inward investment and business development prior ZIDA. Chinjova (2019) provides insight into the many problems that existed during the preceding 20 years and how that lead to Bulawayo losing its way as Zimbabwe's industrial hub. Whilst progress would appear to be being made, it falls short of being able to offer a compelling reason to be the selected location for the Africa region.



Corruption in Zimbabwe has the worst ranking of all 9 shortlisted countries:



Zimbabwe also has the lowest World Bank DB rank of all 9 shortlisted countries:

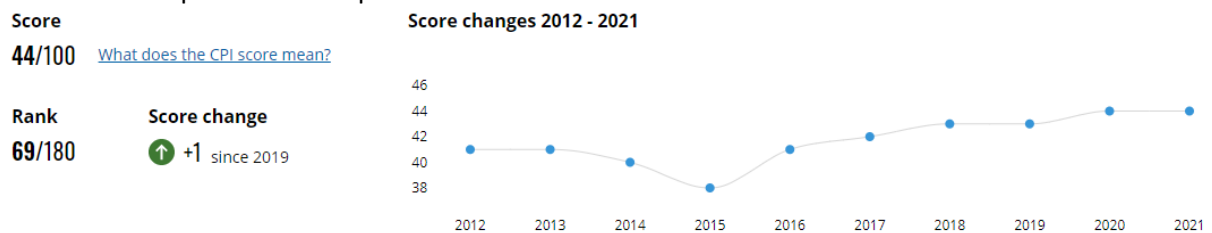


Tunisia - Tunis

The Foreign Investment Promotion Agency's website, [Invest in Tunisia](#), cites Electronics as one of the country's six manufacturing strength and focus areas.



Tunisia's corruption rank is equal to that of South Africa:

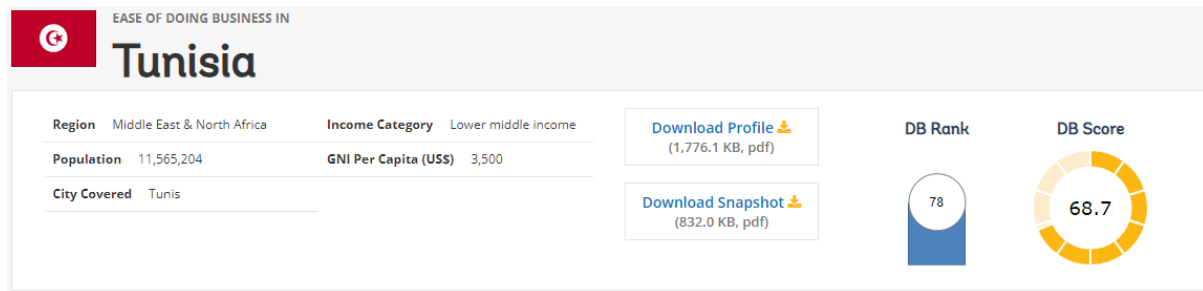


The EIU's Business Environment score (2016-20) for **Tunisia** is:

Score: **5.02 / 10**

World Rank **67/82**

Tunisia has the best World Bank DB rank of the shortlisted African countries:



Tunis is by far the closest to the Mid Wales Headquarters and benefits from a direct flight time of 3 hours from London. The time zone difference is GMT +1.

The GFDRR hazard levels for Tunis include 3 high and 2 medium ratings.

Both Tunisia and South Africa score well in the WIPO Global Innovation Index 2021 rankings (WIPO, 2021, pp 4-5) but Tunis is selected as the recommendation for the Africa region for the above and following reasons:

- Tunis is the capital city and a major transport hub for the MENA region.
- It has free trade agreement for industrial good with the EU and is a member of the Greater Arab Free Trade Agreement (GAFTA).
- Proximity to European providers of technical support for the deployed manufacturing systems. Regional support is not as mature which is a risk for continuity of operations in the southern African states.

Innovation Management Standards

The benefits of standardisation in business processes can be seen in many sectors. Trott (2017, pp. 173-174) notes that prior to 1994, many countries had developed their own standardised approach to quality management. Combining these various national standards into the ISO 9000 set of standards enabled better international understanding, cooperation, and comparison. The 2019 launch of the ISO 56000 series of standards for Innovation Management aims to assist organisations in a similar way with a shared and consistent lexicon underpinned with a standard set of terms and definitions. For Organisation X's plan to expand operations with 3 new manufacturing sites in 3 new regions of the world, the standardisation of the approach to managing innovation across 4 sites - each with significant differences in native language and culture - would likely benefit from adoption of the ISO 56000 approach. With more sites and more teams, there is likely to be a significant expansion in the size of the innovation project portfolio. A professionalisation of innovation management via the adoption of a standards-based approach is highly likely to result in a more balanced portfolio with the associated benefits.

As well as a shared and consistent vocabulary, ISO 56000 also provides a structure by which innovation management can become more visible and well understood within and across an organisation. With better management understanding, the chances of sustained innovation activities having a positive impact on the organisation are enhanced.

With a technical committee of over 300 experts from over 60 countries, ISO 56000 can also be seen as an ongoing mechanism of sharing global best practice; something that a company like Organisation X can also benefit from.

Finally, ISO/TR 56004 provides guidance and a framework of options for the assessment of an organisation's Innovation Management practices and activities.

Many progressive businesses have several well established standards so the co-existence and interaction between standards needs careful consideration. Tidd & Bessant (2018, p. 114) cite a study which found that quality circles and ISO 9000 had positive outcomes in examples of incremental new product development but negatively impacted the development of radical new products. As many innovation activities are run as projects, consideration of how PRINCE2 and ISO 56000 could co-exist needs to be evaluated. From an environmental and sustainability perspective, the ISO 14000 series and the 20017 BS 8001 - Framework for implementing the principles of the circular economy in organisations (BSI, 2022) are another grouping of standards with overlapping themes.

In concluding, the benefits of any of these – alone or in combination - will only be sustained if the management commit to supporting the whole organisation in adopting and maintaining the processes and procedures that keep these standards - and the work they support – relevant and alive.

Glossary of Terms

BSI - British Standards Institution

EIU – (The) Economist Intelligence Unit

EU – European Union

FDI – Foreign Direct Investment

GFDRR - Global Facility for Disaster Reduction and Recovery

IC – Integrated Circuit

ISO – International Standards Organisation

MENA – Middle East & North Africa

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