

# IESE Cities in Motion Index

2020



IESE  
Cities in  
Motion



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2020

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# Foreword

We are pleased to present our publication, *IESE Cities in Motion Index (CIMI)*, for the seventh consecutive year. As a result of the COVID-19 health crisis, this edition finds us at a peculiar moment in history. With bewilderment, we observe how cities around the world are left deserted, their streets emptied of their usual daily sounds. Many of the recommendations that urban managers have been calling for in recent years no longer make sense. The quest for better population density rates has been replaced by social distancing; the use of public transportation is discouraged, with the use of private vehicles promoted in its place; instead of enjoying social interaction in squares and common spaces, we are confined to our homes; and the mantra of our “Cities in Motion” initiative stands as a mere wish rather than a reality. We trust that this situation will be resolved as soon as possible and that our cities’ usual vitality and dynamism will soon become part of our lives once again.

In this context, we will be repeatedly hearing about, in city forums, the concept of urban resilience or the ability of cities to overcome traumatic circumstances. Although our index—**CIMI**—does not capture the circumstances of the health crisis, since its indicators are from 2019 and earlier, we believe that it helps identify the main pillars which cities can adapt positively to these new adverse situations. Our study can be used as a reference for understanding the reality of cities and the aspects on which to base their recovery, as well as for identifying their most vulnerable facets.

Every year we try to improve how we build our index, and this seventh edition is no exception. We have tried to provide an index that is comprehensive, wide-ranging and guided by the criteria of conceptual relevance and practical utility. In this sense, this year we have increased the number of variables in relation to the cities. This edition includes a total of 101 indicators (five more than in the previous edition), which reflect both objective and subjective data and offer a comprehensive view of each city. Among the new variables are, for example, the use of the internet for video calls, the rental of bicycles and scooters, and the use of online banking. These new indicators seek a more accurate assessment of the reality of the cities included in the **CIMI**.

It’s important to remember the limitations of the data. On the one hand, there is the problem of some indicators that are only available at the country level and that are approximated at the city level. On the other hand, there are variables that may underestimate the impact of a particular dimension owing to the regulatory aspects or the city’s own circumstances. For example, the variables that seek to measure the collaborative economy—such as the presence of Glovo or Uber—do not take into account all the different types of local initiatives, such as Delivery Club and Yandex in Moscow. Another example is social media measurements: in certain regions, such as China, platforms such as WeChat prevail, but access to its data is restricted. These limitations mean that certain dimensions must be interpreted with caution.

In addition, this year, in the search for greater accuracy, one of our main data providers (Euromonitor) has changed its methodology for measuring certain variables. These differences oblige us to remind the reader that the rankings are not directly comparable from one year to another. The inclusion of new cities and new indicators produces variations that do not necessarily reflect the trajectory of the same cities over time. In order to be able to study cities’ evolution, in each edition we analyze the trend by calculating the index of the last three years, and this allows us to make more suitable comparisons.

As in previous editions, we have merged two dimensions of our conceptual model, which originally took into account 10 key dimensions: human capital, social cohesion, the economy, public management, governance, the environment, mobility and transportation, urban planning, international projection, and technology. We have retained the merger of governance and public management in a single category (called “governance”) for two fundamental reasons: in the first place, because there is a certain overlapping between both dimensions that makes it difficult to distinguish between them conceptually and, secondly, because the limited number of city-related indicators that cover each of these dimensions led us to join them together so we have a more reliable measure. We believe that

this change does not significantly affect the **CIMI** conclusions, but instead strengthens them. In any case, we continue to strive to obtain more and better indicators that will capture these dimensions and thereby achieve a model which represents greater coverage as well as a growing analytic value. In this respect, your comments and suggestions are always welcome, as they will enable us to make progress. We therefore invite you to contact us through our website: [www.iese.edu/cim](http://www.iese.edu/cim).

One of this year's innovations is the CIMI Calculator, which will be available on our website. The data of any city included in this index can be entered into the calculator, which then shows the position that the city would occupy in the ranking. It's a useful and practical tool both for those cities that are already reflected in the ranking and which wish to see the changes that occur with more up-to-date variables, and for those that are not in the **CIMI** but would like to know where they stand in the ranking. This calculator will be available shortly on our website.

In addition, we would like to inform our readers that our efforts here at the IESE Cities in Motion platform are not limited to just ranking cities. We have continued to publish our series of minibooks in English, which identify good practices in each of the dimensions of the IESE Cities in Motion model. Five of them—about the environment, mobility and transportation, the economy, social cohesion and international projection—are currently available on Amazon. The next volume in the series will be devoted to urban technology; the collection will soon be expanded to cover the rest of the dimensions.

In addition, two new case studies have been completed in addition to the existing ones on Vancouver ("Vancouver: The Challenge of Becoming the Greenest City"), Barcelona ("Barcelona: A Roman Village Becoming a Smart City"), Málaga ("Málaga: In Search of its Identity as a Smart City") and Medellín ("Medellín's Transformation: Towards a More Equitable, Innovative and Participatory Urban Society"). One of the two new case studies deals with the shared mobility company Scoot ("Scoot: Triumphing in the United States, Breaking Through in Spain") and the other deals with the initiative in Toronto by Sidewalk Labs, a company involved in the construction of smart cities. These documents can be accessed on the IESE case study portal ([www.iesepublishing.com](http://www.iesepublishing.com)). This new teaching material has allowed us to consolidate our courses linked to cities both in IESE programs and in those undertaken in collaboration with other schools and institutions.

At the same time, we are continuing to work on a series of academic papers, with a special focus on the Sustainable Development Goals (SDGs) adopted by the United Nations in urban contexts. In this regard, we have published a paper entitled "[EASIER: An Evaluation Model for Public–Private Partnerships Contributing to the Sustainable Development Goals](#)," which provides a model for evaluating the social, economic and environmental impact of public–private partnerships on the SDGs. This paper is being used by UNECE (United Nations Economic Commission for Europe) as the basis for the development of its own model, a process in which we are collaborating closely. In addition to this article, a second paper has been published in the *Academy of Management Discoveries* magazine, which studies the impact that nongovernmental organizations (NGOs) have on the sustainability of cities. A summary video can be accessed at the following link: [youtu.be/V6SuH\\_i80OM](https://youtu.be/V6SuH_i80OM). We have also published a third academic paper in the magazine *Strategy Science*, which explores the barriers and solutions faced by digital platforms (such as Uber and Airbnb) in urban contexts. In addition to these publications, several academic papers have been published in prestigious journals such as the *Academy of Management Journal*, the *California Management Review* and the *Harvard Deusto Business Review*. We have also improved the presence of the IESE Cities in Motion platform on the internet with our Twitter account (@iese\_cim) and [our Cities in Motion blog](#). Lastly, it should be noted that we have successfully concluded our participation in various projects such as [GrowSmarter](#), financed by the European Commission, and "Sustainable Cities: Challenges and Opportunities in the Creation of Economically Prosperous, Environmentally Responsible and Socially Just Cities," ("Ciudades sostenibles: Retos y oportunidades en la creación de ciudades económicamente prósperas, medioambientalmente responsables y socialmente justas") financed by the Ministry of Economy, Industry and Competitiveness of the Government of Spain.

We are confident that this work will be useful for those in charge of making our cities better environments in which to live, work and enjoy life. Urban managers are currently facing the traditional obstacles of difficulties in mobility, aging populations, increasing inequality, persistent poverty and pollution, as well as new challenges that the COVID-19 crisis has revealed. The scope and magnitude of these new challenges demonstrate the need for the world's cities to carry out a strategic review process that covers the following: what type of city they want to be, what their priorities are, and what changes they should undertake in order to take advantage of the opportunities—and minimize the threats—of urbanization. Our effort therefore focuses on the concept of smart governance and this report is our humble contribution to advancing this process.

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# About Us

IESE Cities in Motion is a research platform launched jointly by the Center for Globalization and Strategy and IESE Business School's Department of Strategy.

The initiative connects a global network of experts in cities and specialist private companies with local governments from around the world. The aim is to promote changes at the local level and to develop valuable ideas and innovative tools that will lead to more sustainable and smarter cities.

The platform's mission is to promote the Cities in Motion model, with an innovative approach to city governance and a new urban model for the 21st century based on four main factors: sustainable ecosystem, innovative activities, fairness among citizens and connected territory.

# Working Team

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## ACADEMIC TEAM

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## Introduction: The Need for a Global Vision

Today more than ever, cities need to develop strategic planning processes, since only then can they outline paths toward innovation and prioritize the most important aspects for their future.

This process should be participatory and flexible, with the central aim of defining a sustainable action plan that will make the metropolis both unique and renowned. Just as two companies do not have the same recipe for success, each city must look for its own model based on a series of common reflections and considerations.

Experience shows that large cities must eschew short-termism, broaden their view and turn to innovation more frequently in order to improve the efficiency and sustainability of their services. In addition, they should promote communication and ensure that the public and businesses are involved in their projects.

This analysis is even more relevant in the current context of COVID-19. The strain of the pandemic reveals how prepared cities really are to face a crisis that shakes their stability across many dimensions. The time has come to practice smart governance, taking into account—with a more global vision—all factors and social actors. In fact, over the past few decades, various local and international organizations have produced studies focusing on the definition, creation and use of indicators with a variety of aims, although mainly to contribute to a diagnosis of the state of cities. The definition of the indicators and the process of their creation are the result of the features of each study, the statistical and econometric techniques

that best fit the theoretical model and the available data, as well as the analysts' preferences.

As of today, we have a large number of "urban" indicators, but many of them are neither standardized nor consistent and they cannot be used to compare cities. In fact, despite numerous attempts to develop city indicators at a national, regional and international level, few have been sustainable in the medium term, as they were created for studies usually intended to cover the specific information needs of certain bodies, whose lifespan depended on how long the financing would last. In other cases, the system of indicators depended on the political will in specific circumstances, so they were abandoned when political priorities or the authorities themselves changed. As for the indicators developed by international organizations, it is true that they strive for the consistency and solidity necessary to compare cities; however, for the most part, they tend to be biased or focused on a particular area (technology, the economy, and the environment, etc.).

Taking all this into account, the *IESE Cities in Motion Index (CIMI)* has been designed with the aim of constructing a "breakthrough" indicator in terms of its completeness, characteristics, comparability and the quality and objectivity of the information included. Its goal is to enable the measurement of the world's major cities' future sustainability as well as the quality of life of these cities' inhabitants.

The **CIMI** is intended to help the public and governments to understand the performance of nine fundamental dimensions of a city: human capital, social cohesion, the

economy, governance, the environment, mobility and transportation, urban planning, international projection, and technology. All the indicators are linked with a strategic purpose whose goal is to implement a novel form of economic and social development that involves the creation of a global city, the promotion of an entrepreneurial spirit, innovation, and social justice, among other aspects.

Each city is unique and unrepeatable and has its own needs and opportunities; it must therefore design its own plan, set its priorities, and be flexible enough to adapt to changes.

Smart cities generate numerous business opportunities and possibilities for collaboration between public and private sectors. Because all stakeholders can contribute, an ecosystem network must be developed that will involve all of them: members of the public, organizations, institutions, governments, universities, companies, experts, research centers, and nonprofit organizations.

Networking has its advantages: better identification of the needs of the city and its residents, the establishment of common aims and constant communication among participants, the expansion of learning opportunities, increased transparency, and the implementation of more flexible public policies.

Private enterprise also has much to gain with this system of networking: it can collaborate with government in the long term, access new business opportunities, gain a greater understanding of the needs of the local ecosystem, gain greater international visibility and attract talent.

Thanks to its technical expertise and its experience in project management, private enterprise, in collaboration with universities and other institutions, is suited to lead and develop smart city projects. In addition, it can provide efficiency and result in significant savings for public-private bodies.

Finally, it must not be forgotten that the human factor is fundamental in the development of cities. Without a participatory and active society, any strategy—albeit intelligent and comprehensive—will be doomed to failure. Beyond technological and economic development, it is the public that holds the key for cities to go from “smart” to “wise.” That is precisely the goal to which every city should aspire: that the people who live there and those who govern deploy all their talent in favor of progress.

To help cities identify effective solutions, we have created an index that integrates nine dimensions in a single indicator and covers 174 cities worldwide. Thanks to its broad and integrated vision, the **CIMI** enables the strengths and weaknesses of each of the cities to be identified.



9 DIMENSIONS



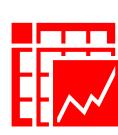
80 COUNTRIES



174 CITIES



79 CAPITALS

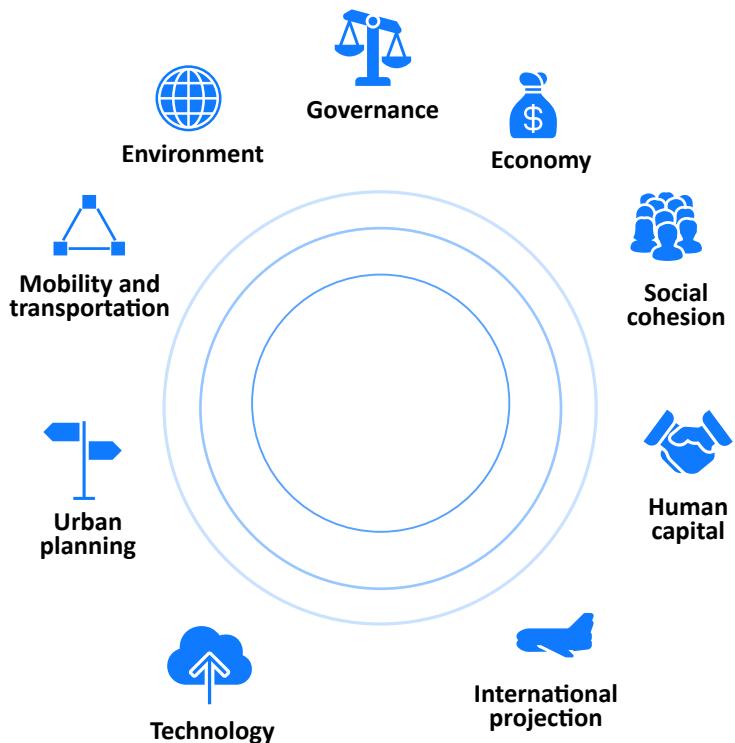


101 INDICATORS

# Our Model: Cities in Motion. Conceptual Framework, Definitions and Indicators

Our platform proposes a conceptual model based on the study of a large number of success stories and a series of in-depth interviews with city leaders, entrepreneurs, academics and experts linked to the development of cities.

This model proposes a set of steps that include diagnosis of the situation, the development of a strategy, and its subsequent implementation. The first step to making a good diagnosis is to analyze the status of the key dimensions, which we will set out below along with the indicators used to calculate the **CIMI**.



## Human Capital

The main goal of any city should be to improve its human capital. A city with smart governance must be capable of attracting and retaining talent, creating plans to improve education, and promoting both creativity and research.

**Table 1** sets out the indicators used in the human capital dimension, along with their descriptions, units of measurement, and information sources.

While human capital includes factors that make it more extensive than what can be measured with these indicators, there is international consensus that level of education and access to culture are irreplaceable components for measuring human capital. One of the pillars of human development is this capital and, given that the Human Development Index (HDI) published annually by the United Nations Development Program (UNDP) includes education and culture as dimensions, it is valid to use these indicators to explain the differences in human capital in a city.

To define this dimension, the **CIMI** includes the 10 variables detailed in **Table 1**. Most of the variables are shown in the index with a positive sign due to their contribution to the development of the dimension, the exception being per capita expenditure on education.

To measure access to culture, the number of museums, art galleries and theaters and the expenditure on leisure and recreation are taken into account. These indicators show the city's commitment to culture and human capital. Cities that are considered creative and dynamic on a

global level typically have museums and art galleries open to the public, offer visits to art collections, and carry out activities aimed at their conservation. The existence of a city's cultural and recreation provision results in greater expenditure on these activities by the population.

Finally, expenditure on education per capita represents what each member of the public spends individually to obtain an appropriate level of education. A high figure is an indicator that state spending on education is insufficient, since it forces citizens to bear that cost to access adequate education. This variable is given with a negative sign.



## Social Cohesion

A large number of cities measure their intelligence based solely on how up to date their technology is. However, the number of cities that incorporate social cohesion as a key element in their development is increasing. Large cities such as New York and Tokyo have included specific actions within their smart city strategies to allow them to be inclusive, aimed at the diversity of their citizens and the needs of each social group.

Social cohesion is a sociological dimension of cities that can be defined as the degree of consensus among the members of a social group or as the perception of belonging to a common situation or project. This is a measure of the intensity of social interaction within the group.

Social cohesion in the urban context refers to the level of coexistence among groups of people living in the same

**Table 1. Human Capital Indicators**

No.	Indicator	Description / Unit of measurement	Source
1	Secondary or higher education	Proportion of population with secondary and higher education.	Euromonitor
2	Schools	Number of public or private schools per city.	OpenStreetMap
3	Business schools	Number of business schools in the city that are included in the Top 100 of the Financial Times.	<i>Financial Times</i>
4	Expenditure on education	Per capita expenditure on education.	Euromonitor
5	Per capita expenditure on leisure and recreation	Annual per capita expenditure on leisure and recreation.	Euromonitor
6	Expenditure on leisure and recreation	Expenditure on leisure and recreation as a percentage of GDP.	Euromonitor
7	Movement of students	International movement of higher-level students (number of students).	UNESCO
8	Museums and art galleries	Number of museums and art galleries per city.	OpenStreetMap
9	Number of universities	Number of universities in the top 500.	QS Top Universities
10	Theaters	Number of theaters per city.	OpenStreetMap

city with different income levels, cultures, ages and professions. Understanding the city's social setting requires an analysis of factors such as immigration, community development, care of the elderly, the effectiveness of the health system, and public inclusion and safety. In times of COVID-19, the efficiency and universality of health systems will be evaluated and measured even more carefully; we are confident that the health crisis will serve to understand the importance of these systems and to strengthen them.

The presence of various groups mixing and interacting amongst themselves in the same space is essential in a sustainable urban system. In this context, social cohesion is a state in which citizens and the government share a vision of a society based on social justice, the primacy of the rule of law, and solidarity. This allows us to understand the importance of policies that foment and reinforce social cohesion based on democratic values.

**Table 2** sets out the indicators selected to analyze this dimension, descriptions of them, their units of measurement and the sources of information. This selection seeks to incorporate all the sociological subdimensions of social cohesion, taking into account the different variables available.

The ratio of deaths per 100,000 inhabitants and the crime rate are given with a negative sign when creating this dimension. Meanwhile, the healthcare index and the number of public and private hospitals and health centers per city are added with a positive sign, since access to and coverage provided by basic social services contribute to strengthening social cohesion.

Employment is a fundamental aspect in societies, to the extent that, according to historical evidence, a lack of it can break the consensus or the implicit social contract. For this reason, the unemployment rate is incorporated with a negative sign in the dimension of social cohesion. For its part, the ratio of women who work in public administration is incorporated with a positive sign, since it is an indicator of gender equality in access to government jobs.

The Gini index is calculated from the Gini coefficient and measures social inequality. It assumes a value of 0 for situations in which there is a perfectly equitable distribution of income (everyone has the same income) and it assumes a value of 100 when the income distribution is completely unequal (one person has all the income and the others nothing). This indicator is included in the dimension with a negative sign since a greater Gini coefficient has a negative effect on a city's social cohesion.

Meanwhile, the Global Peace Index is an indicator that represents the degree of tranquility and peace in a country or region, as well as the absence of violence and war. It includes internal variables such as violence and crime and external ones, such as military spending and the wars in which the country takes part. The countries at the top of the ranking are countries with a low level of violence, so the indicator has a negative relationship with the **CIMI**.

The price of property as a percentage of income is also negatively related since, as the percentage of income to be used to buy a property increases, the incentives to belong to a particular city's society decrease.

**Table 2. Social Cohesion Indicators**

No.	Indicator	Description / Unit of measurement	Source
11	Female-friendly	This variable shows whether a city provides a friendly environment for women, on a scale of one to five. Cities with a value of 1 have a more hostile environment for women, while those with a value of 5 are very friendly.	Nomad List
12	Hospitals	Number of public or private hospitals by city. Includes health centers.	OpenStreetMap
13	Crime rate	Estimate of the general level of crime in a given city.	Numbeo
14	Slavery index	This variable represents the response of the national government to situations of slavery in the country. The top ranking countries are those that have the best response to the problem.	Walk Free Foundation
15	Happiness index	The countries with the highest value in this index are those with the highest degree of overall happiness.	World Happiness Index
16	Gini index	The Gini index has a scale from 0 to 100, with 0 indicating a situation of perfect equality and 100 one of perfect inequality.	Euromonitor
17	Peace index	This index (Global Peace Index) is an indicator that measures the level of peace and the absence of violence in a country or region. The bottom-ranking positions correspond to countries with a high level of violence.	Centre for Peace and Conflict Studies at the University of Sydney
18	Health index	Estimate of the overall quality of the healthcare system, health professionals, equipment, personnel, doctors, costs, etc.	Numbeo
19	Price of property	Price of property as percentage of income. This is calculated as the relationship between the average price of an apartment and the average annual household disposable income.	Numbeo
20	Homicide rate	Homicide rate per 100,000 inhabitants.	NomadList
21	Death rate	Death rate per 100,000 inhabitants.	Euromonitor
22	Female employment ratio	Ratio of female workers in the public administration. Between 0 and 1.	International Labor Organization
23	Suicide rate	Suicide rate per 100,000 inhabitants.	Nomad List
24	Unemployment rate	The unemployment rate is calculated as (number of unemployed/total workforce) x 100.	Euromonitor
25	Terrorism	Number of terrorist incidents by city in the last three years.	Global Terrorism Database, University of Maryland

With regard to happiness, it is increasingly considered a suitable measure of social progress and has become a goal of government policies. According to the World Happiness Report, people assert they are happy if they have a stable job and are healthy and if there is a more homogeneous distribution of wealth within the country or city where they live. To represent this degree of satisfaction, the happiness index is included in the **CIMI**. This variable is included with a positive sign, since the countries that show themselves to be “happiest” (with high values in the index) are those that pay special attention to freedom, employment, healthcare, income and good governance. Thus, the happiness of a country or city would also be reflected in greater social coexistence.

The proportion of people who are enslaved—which is considered a crime—in a country is incorporated with a negative sign in the ranking, since it does not contribute to the development of a just and socially united city.

The terrorism variable, which takes into account terrorist vandalism committed in the last three years in the city, is shown with a negative sign, since these acts threaten the city's social peace.

The female-friendly variable aims to measure the degree to which cities are spaces in which women can develop and move freely and safely. It is presented in categories from 1 to 5, where the highest category corresponds to the friendliest for women. For this reason, the variable is incorporated into the index with a positive sign.

Finally, the suicide rate and the homicide rate by city are included in the index with a negative sign, due to their incidence in the dimension. Cities with a higher homicide rate more insecure, while the higher the suicide rate, the less attractive there are to live in.



## Economy

This dimension includes all those aspects that promote the economic development of a territory: local economic development plans, transition plans, and strategic industrial plans; cluster generation; innovation; and entrepreneurial initiatives.

The indicators used to represent the performance of cities in the economic dimension are specified in **Table 3**, along with a brief description, their units of measurement, and the respective sources of information.

Considering that the **CIMI** seeks to measure, via multiple dimensions, the future sustainability of the world's main cities and the quality of life of their inhabitants, real GDP is a measure of the city's economic power and the income of those who live there. Indeed, in numerous studies, GDP is considered the only or the most important measure of the performance of a city or country. However, in this report it is not considered as exclusive nor as the most important measure, but as one more indicator within the framework of the nine dimensions of the **CIMI**. Thus, its share of the total is similar to that of other indicators. For example, if a city with a high or relatively high GDP does not have a good performance in other indicators, it may not occupy one of the top positions. In

this way, a city that is very productive but has problems with transportation, inequality, weak public finance or a production process that uses polluting technology probably will not be in the top positions of the ranking. The variable showing forecast annual GDP growth is used to study the future evolution of the city.

For its part, labor productivity allows for a measurement of the strength, efficiency and technological level of the production system. With regard to local and international competitiveness, productivity will have repercussions, obviously, on real salaries, capital income, and business profits—for which reason, it is very important to consider the measure in the economic dimension, since different productivity rates can explain differences in workers' quality of life—and the sustainability over time of the production system.

Other indicators selected as representative of this dimension enable the measurement of some aspects of the business landscape of a city, such as the number of headquarters of publicly traded companies; the entrepreneurial capacity and possibilities of a city's inhabitants, represented by the percentage of entrepreneurs who start their activity motivated by personal improvement; the time required to start a business; and the ease, in regulatory terms, of setting up a business. These indica-

**Table 3. Economic Indicators**

No.	Indicator	Description / Unit of measurement	Source
26	Collaborative economy	Whether the city has Uber and/or Glovo services.	Uber and Glovo
27	Ease of starting a business	The top positions in the ranking indicate a more favorable regulatory environment for creating and operating a local company.	World Bank
28	Mortgage	Mortgage as a percentage of income is the ratio of the real monthly mortgage cost to the family income (the lower, the better).	Numbeo
29	Motivation that people have to undertake early-stage entrepreneurial activity	Percentage of new entrepreneurs who are motivated by an opportunity for improvement divided by the percentage of new entrepreneurs who are motivated by need.	Global Entrepreneurship Monitor
30	Number of headquarters	Number of headquarters of publicly traded companies.	Globalization and World Cities (GaWC)
31	Purchasing power	Purchasing power (determined by the average salary) for the purchase of goods and services in the city, compared with that of New York City. A value of 40 means that inhabitants of that city on an average salary can afford to buy 60% fewer goods and services than the residents of New York.	Numbeo
32	Productivity	Labor productivity calculated as GDP per working population (in thousands).	Euromonitor
33	Hourly wage in US dollars	Hourly wage in the city in US dollars.	Euromonitor
34	Time required to start a business	Number of calendar days needed for a business to be able to operate legally.	Euromonitor
35	GDP	Gross domestic product in millions of US dollars.	World Bank
36	GDP per capita	Gross domestic product per capita.	Euromonitor
37	Estimated GDP	Forecast annual GDP growth for the next year.	Euromonitor

tors measure a city's sustainability capacity over time and the potential ability to improve the quality of life of its inhabitants. The time required to start a business and the ease of doing so are incorporated into the economic dimension with a negative sign, since lower values indicate a greater ease of starting up businesses. The number of headquarters of publicly traded companies, the entrepreneurial capacity and possibilities of a city's inhabitants and the number of entrepreneurs have a positive relationship, since the high values of these indicators reflect the economic dynamism of a city and the ease of setting up and starting a new business.

The percentage variable that represents the mortgage in the family income is incorporated to complement the information captured by the private property price. An attempt is made to measure the extent to which access to a 20-year mortgage (fixed term for this purpose) is within the reach of a family with average income. The higher the percentage of the family income taken up by the mortgage, the worse the situation will be for the family. For this reason, the variable is incorporated into the index with a negative sign.

Taking into account the degree of dissemination of new technologies and the services that emerge from them, this year the collaborative economy variable is used to represent the progress of these services in the cities. Services such as Glovo or Uber are grouped in it, with values from 0 to 3, depending on the presence of these services in the city in the period 2017-2019. A value of 0 implies the non-existence of a collaborative economy in the city throughout the period while a value of 3 indicates that it has had some of these services over the last three years. Values of 1 and 2 are assigned to cities that have some of these services during a part of the period under consideration. This variable is shown with a positive sign.

Finally, the hourly wage in the city variable and the index representing the purchasing power for goods and services in the city compared to that of a citizen in New York are incorporated with a positive sign, since high values indicate a more favorable employment situation.



## Governance

Governance is the term commonly used to describe the effectiveness, quality and sound guidance of state intervention. Given that the city resident is the focal point for solving all the challenges facing cities, factors such as the level of the public's participation and the authorities' ability to involve business leaders and local stakeholders should be taken into account, as well as the application of e government plans. Moreover, this dimension encompasses all those actions aimed at improving the administration's efficiency, including the design of new organizational and management models. In this area, great

opportunities open up for private initiative, which can bring greater efficiency.

In this work, governance is understood to be strongly correlated with the state of public finances of a city or country. In this sense, public accounts decisively affect the population's quality of life and a city's sustainability, since they determine the level of present and future taxes that the residents and the production system must face, the expected growth of the general level of prices, the possibilities of public investment in basic social infrastructure, and incentives for private investment. In addition, if the state has financing needs, it will compete with the private sector for funds available in the financial system, which will affect investment.

The indicators that represent the governance dimension in this report are listed in **Table 4**, along with their descriptions, units of measurement, and sources of information.

The level of reserves is an indicator of the strength of the public finance system in the short and medium term, of their ability to cope with changing economic cycles, and of the strength and sustainability of the economic structure in relation to the state. Likewise, the number of embassies and consulates is an indicator of the city's international importance for global standards and is based on the embassies that foreign countries assign to the city.

Cities with ISO 37120 certification are committed to improving their services and quality of life. This certification sets the standard for smart cities, based on 100 indicators. The aim of this is to provide a basis for comparing all the cities equally. This variable is incorporated with a positive sign.

For their part, the number of research centers and the number of government buildings show the degree of representativeness of local government among the public for attending to their requests and carrying out administrative tasks, etc. These variables are included with a positive sign in the **CIMI** calculation.

The strength of legal rights index measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate access to loans. The values go from 0 (low) to 12 (high) and the highest ratings indicate that the laws are better designed to expand access to credit. Creating the necessary conditions and ensuring the effective implementation of the rights of the public and companies situated in their territory are functions that pertain to national or local governments and cannot be delegated. The perception of the observance of legal rights influences all aspects of life of a country or city, such as its business climate, investment incentives, and legal certainty, among others. For this reason, this index has been included with a positive sign in the creation of this dimension.

**Table 4. Governance Indicators**

No.	Indicator	Description / Unit of measurement	Source
38	Government buildings	Number of government buildings and premises in the city.	OpenStreetMap
39	E Government Development Index (EGDI)	The Electronic Government Development Index (EGDI) evaluates the development patterns of websites in a country and incorporates access features, such as infrastructure and educational levels, to reflect how it uses information technology to promote access and social inclusion.	United Nations
40	Embassies	Number of embassies per city.	OpenStreetMap
41	Employment in the public administration	Percentage of the population employed in public administration and defense; education; healthcare; community, social and personal service activities; and other activities.	Euromonitor
42	Strength of legal rights index	This index measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate access to loans. The values go from 0 (low) to 12 (high), where the highest ratings indicate that the laws are better designed to expand access to credit.	World Bank
43	Corruption perceptions index	Countries with values close to 0 are perceived as very corrupt and those with an index close to 100 are perceived as very transparent.	Transparency International
44	ISO 37120 certification	This establishes whether or not the city has ISO 37120 certification. Certified cities are committed to improving their services and quality of life. This variable is coded on a scale from 0 to 6. Cities that have been certified for the longest time have the highest value; a value of 0 is given to those with no certification.	World Council on City Data (WCCD)
45	Research centers	Number of research and technology centers per city.	OpenStreetMap
46	Open data platform	This describes whether the city has an open data system.	CTIC Foundation and Open World Bank
47	Democracy ranking	The countries in the highest positions are those considered to be the most democratic.	<i>The Economist</i>
48	Reserves	Total reserves in millions of current US dollars. Estimate at city level according to the population.	World Bank
49	Reserves per capita	Reserves per capita in millions of current US dollars.	World Bank

The government corruption perceptions index is a way to measure the quality of governance, since a high perception in society of corruption in public bodies is a sign that state intervention is not efficient from the point of view of the social economy, given that public services—understood in a broad sense—involve higher costs in relation to a situation with no corruption. In addition, incentives to invest or settle in countries or cities with a high perception of corruption will be lower than in others with low levels, which negatively affects sustainability. In the case of the **CIMI**, it is taken as an explanatory indicator of the governance dimension, with a positive sign, due to how the index is calculated by the organization Transparency International, which assigns a value of 0 to countries with a high level of corruption and 100 for those that are very transparent.

Finally, the variable that considers whether a city's government has an open data platform is an indicator of transparency in government management, a communication channel with the public and a platform for generating new business models. The variable assigns a value of 1 if there is an open data platform and 0 otherwise.

Therefore, the indicator is shown with a positive sign into this dimension.

For its part, the EGDI reflects how a country is using information technology to promote access and inclusion for its citizens. It is a measure composed of three important dimensions of e government: the provision of online services, telecommunications connectivity and human capacity. This variable is included with a positive sign.

The democracy index shows the degree of democracy of a country, represented by its electoral system, freedom of expression, functioning of the government, political participation and political culture. It is included with a negative sign since the countries in the highest positions are those considered more democratic.

Finally, a new variable has been incorporated this year for the percentage of employees in public sector jobs, such as education, defense and healthcare, and is included with a positive sign in the dimension, since it is an indicator of the human capital in the public sector.



## The Environment

Sustainable development of a city can be defined as “development that meets the needs<sup>1</sup> of the present without compromising the ability of future generations to meet their own needs.” In this respect, factors such as improving environmental sustainability through antipollution plans, support for green buildings and alternative energy, efficient water and waste management, and the existence of policies that help counter the effects of climate change are essential to guarantee the long-term sustainability of cities.

Since the **CIMI** also seeks to measure environmental sustainability, the environment is included as one of the essential aspects of measurement. **Table 5** sets out the indicators selected in this dimension, as well as brief descriptions, their units of measurement, and the sources of the information.

The indicators selected include measurements of air pollution sources and water quality in cities, which are indicators of the quality of life of their inhabitants, as well as the sustainability of their production or urban matrix.

CO<sub>2</sub> emissions come from the burning of fossil fuels and the manufacture of cement, while methane emissions stem from human activities such as agriculture and the industrial production of methane. Both types of emissions are the main measures that are commonly used to track the degree of air pollution, since they are substances that are strongly related to the greenhouse effect. In fact, reducing these indicators' values is one of the goals of the Kyoto Protocol.

Other very important indicators for measuring air pollution in cities are PM<sub>2.5</sub> and PM<sub>10</sub>, designations that correspond to small particles (solid or liquid) of dust, ash, soot, metal, cement, or pollen, scattered in the atmosphere and whose diameter is less than 2.5 µm and 10 µm, respectively. These particles are formed primarily by inorganic compounds such as silicates and aluminates, heavy metals, and organic material associated with carbon particles (soot). These indicators are commonly used in the indexes that seek to measure the state of environmental pollution. They are also complemented by the information provided by a city's pollution index, which estimates its overall pollution. The greatest weight is given to those with the most polluted air.

The Environmental Performance Index (EPI), calculated by Yale University, is an indicator based on the measurement of two major dimensions related to the environment: environmental health and ecosystem vitality. The first of these is divided into three subdimensions: the effects on human health of air pollution, water quality and the environmental burden of diseases. In turn, ecosystem vitality contains seven subdimensions: the effects on the ecosystem of air pollution, water quality, biodiversity and habitat, afforestation, fish, agriculture, and climate change. Given the completeness of this indicator—which covers almost all aspects related to measuring the state and evolution of the environment in a city, complemented by the other indicators that the **CIMI** incorporates—the environment dimension is considered to be represented proportionately.

Water is a renewable energy source that is fundamental for dealing with climate change and its devastating effects. The variable representing total renewable water sources per capita considers both internal and external renewable surface water resources. It represents the resources available to a country in order to have a sustainable future, which is why it is included with a positive sign in the calculation of the index.

The climate variable represents the percentage summer temperature rise in the city forecast for 2100, assuming pollution caused by carbon emissions continues to increase. This variable shows the future risk of current pollution. It is included with a negative sign because a continuous increase in temperature in a city poses a threat to both public health and the economy.

Finally, the average amount of municipal solid waste (garbage) generated annually per person (kg/year) in a city represents potential harm for its inhabitants and the environment due to the prevalence of poor solid waste management. In many cities, this poor management also means an additional health risk for the people who work with this waste. For this reason, the variable is incorporated into the index with a negative sign.

<sup>1</sup> Definition used in 1987 by the United Nations World Commission on Environment and Development, created in 1983.

**Table 5. Environmental Indicators**

No.	Indicator	Description / Unit of measurement	Source
50	Solid waste	Average amount of municipal solid waste generated annually per person (kg/year).	Waste Management for Everyone
51	Future climate	Percentage of summer temperature increase in the city forecast for 2100 if carbon pollution continues to increase.	Climate Central
52	CO2 emissions	Carbon dioxide emissions that come from the burning of fossil fuels and the manufacture of cement. Measured in kilotons (kt).	World Bank
53	Methane emissions	Methane emissions that arise from human activities such as agriculture and the industrial production of methane. Measured in kt of CO2 equivalent.	World Bank
54	Environmental performance index	Environmental Performance Index (from 1 [poor] to 100 [good]).	Yale University
55	CO <sub>2</sub> emission index	CO <sub>2</sub> emission index.	Numbeo
56	Pollution index	Pollution index.	Numbeo
57	PM <sub>10</sub>	Number of particles in the air with a diameter of less than 10 µm. Annual average.	WHO
58	PM <sub>2.5</sub>	Number of particles in the air with a diameter of less than 2.5 µm. Annual average.	WHO
59	Percentage of the population with access to the water supply	Percentage of the population with reasonable access to an appropriate quantity of water resulting from an improvement in the water supply.	World Bank
60	Renewable water resources	Total renewable water sources per capita.	FAO



## Mobility and Transportation

The cities of the future must tackle two major challenges in the field of mobility and transportation: facilitating movement (often over large territories) as well as access to public services.

Mobility and transportation—both with regard to road and route infrastructure, the vehicle fleet, and public transportation, as well as to air transportation—affect the quality of life of a city's inhabitants and can be vital to the sustainability of the city over time. However, perhaps the most important aspect is the externalities that are generated in the production system, both because of the workforce's need to commute and because of the need for an outlet for production.

**Table 6** sets out the indicators selected in the dimension of mobility and transportation, along with their descriptions, units of measurement, and information sources.

Three new variables have been incorporated this year related to bicycle, moped and scooter rental services, which capture the incidence of micromobility in cities. The three variables are binary, indicating the existence or non-existence of these services in the city. They are shown with a positive sign.

The traffic index (considered in exponential terms), the traffic index and the inefficiency index are estimates of the traffic inefficiencies due to long driving times and the

dissatisfaction that these situations generate in the population. These indicators are a measure of the safety of roads and public transportation, which, if it is effective and has a good infrastructure, promotes a decrease in vehicular traffic and reduces the number of accidents. All these are included with a negative sign in the calculation of the **CIMI** because they have a negative impact on the development of a sustainable city.

The bike-sharing indicator collects information about a city's bike-sharing system, which enables moving from one location to another using bicycles available for public use. It varies between 0 and 8, where 0 refers to the lack of this system in the city and 8 refers to a highly developed system. It is incorporated with a positive sign in the **CIMI**.

Meanwhile, the number of metro stations and the length of the system are indicators of commitment to the development of the city and investment with respect to the population size. Similarly, the number of incoming air routes and the possession of a high-speed train system are indicative of the degree of mobility development. A highly developed city will favor the incorporation of new commercial air routes, as well as the circulation and transit of passengers using different means of transportation. These indicators are included with a positive sign in the calculation of the index thanks to the positive effect they have on the dimension.

**Table 6. Mobility and Transportation Indicators**

No.	Indicator	Description / Unit of measurement	Source
61	Bicycle rental	Whether the city has a bicycle rental service.	Numo
62	Moped rental	Whether the city has a moped rental service.	Numo
63	Scooter rental	Whether the city has a scooter rental service.	Numo
64	Bicycles per household	Bicycles owned per household.	Euromonitor
65	Bike sharing	This system shows the automated services for the public use of shared bicycles that provide transportation from one location to another within a city. The indicator varies between 0 and 8 according to how developed the system is.	Bike-Sharing World Map
66	Traffic inefficiency index	This index is an estimate of the inefficiencies in traffic. High values represent high rates of inefficiency in driving, such as long journey times.	Numbeo
67	Exponential traffic index	This index is estimated by considering the time spent in traffic. Dissatisfaction with travel times is assumed to increase exponentially beyond 25 minutes.	Numbeo
68	Traffic index	Index of time based on how many minutes it takes to get to work.	Numbeo
69	Length of the metro system	Length of the city's metro system.	Metrobits
70	Metro stations	Number of metro stations per city.	Metrobits
71	High-speed train	Binary variable that shows whether the city has a high-speed train or not.	OpenRailwayMap
72	Commercial vehicles in the city	Number of commercial vehicles in the city.	Euromonitor
73	Flights	Number of incoming flights (air routes) in a city.	OpenFlights

The variables concerning the number of commercial vehicles and number of bicycles per home that the city has are given a positive negative sign due to the negative and positive influence, respectively, that they exert on traffic and traffic congestion.



## Urban Planning

Urban city planning has always been considered a driving force of development and poverty reduction. Today, it constitutes a collective exercise that must involve all actors, including citizens, civil society organizations, the public and private sectors, multilateral organizations and academia.

In turn, urban planning is closely related to sustainability. To improve the habitability of any territory, it is necessary to take into account the local master plans and the design of green areas and spaces for public use, as well as opting for smart growth. The new urban planning methods should focus on creating compact, well-connected cities with accessible public services.

Depending on the information available, several aspects related to urban plans, the quality of health infrastructure,

and housing policies are incorporated as indicators of this dimension. **Table 7** sets out the indicators included in this dimension, along with descriptions of them, their units of measurement, and the sources of information used.

The bicycle is an effective, fast, economical, healthy, and environmentally friendly means of transportation. Its use therefore has a positive impact on a city's sustainable development as it does not cause pollution or use fuel, among other benefits. Considering this positive effect, the index includes in the **CIMI** the number of points for the rental or sharing of this means of transportation, based on docking stations where bicycles can be picked up or dropped off. Many cities historically considered to be smart cities have a certain positive correlation with a widespread presence of cycling. As a result, this variable is incorporated with a positive sign.

For its part, the quality of sanitation services refers to the percentage of the urban population with improved sanitation facilities that are not shared with other households. This indicator has a high correlation with that of urban planning, since it can be shown that inadequate planning inevitably results in health problems in the short and medium term.

**Table 7. Urban Planning Indicators**

No.	Indicator	Description / Unit of measurement	Source
74	Bicycles for rent	Number of bike-rental or bike-sharing points, based on docking stations where bikes can be picked up or dropped off.	OpenStreetMap
75	Buildings	This variable is the number of completed buildings in the city. It includes structures such as high-rise and low-rise buildings but excludes other diverse structures and buildings in different phases of completion (design, construction, etc.).	Skyscraper Source Media
76	Number of people per household	Average number of people per household.	Euromonitor
77	Percentage of the urban population with adequate sanitation services	Percentage of the urban population that uses at least basic sanitation services—that is, improved sanitation facilities that are not shared with other households.	World Bank
78	Buildings over 35 meters high	Number of buildings at least 12 stories or 35 meters high (high-rise).	Skyscraper Source Media

In addition, from the urban planning and housing point of view, a city with proper urban planning generally has few or no problems of overcrowding in households, since normally housing policy, in relation to the estimated growth of the urban population, is a determining factor in urban planning. For this reason, within the explanatory indicators of this dimension, the number of occupants of each household was considered with a negative sign.

Finally, the number of completed buildings and the number of buildings over 35 meters high contribute to the creation of compact and organized cities. These variables are incorporated with a positive sign.



## International Projection

Cities that want to progress must secure a privileged place in the world. In this respect, maintaining global outreach involves improving the city brand and its international recognition through strategic tourism plans, the attracting of foreign investment and representation abroad.

Cities can enjoy a greater or lesser international projection even if they are from the same country, but this is not independent of the degree of openness nationally. This dimension seeks to reflect these differences and to measure the international projection of cities.

For this purpose, the following indicators have been included: airports, number of passengers by airport, number of hotels in a city, ranking of the most popular places in the world according to Sightsmap, and number of meetings and conferences that are held according to data from the International Congress and Convention Association (ICCA). This last indicator is important for a city's international projection, taking into account that these events usually take place in cities with international hotels, meeting rooms specially fitted out for such ends,

good frequency of international flights, and appropriate security measures. **Table 8** summarizes these indicators, along with descriptions of them, their units of measurement, and the source of the information.

All indicators of this dimension, except for the number of photos uploaded to the web, are given a positive sign in the **CIMI** calculation since higher values indicate that the city has a growing global projection. Sightsmap is incorporated with a negative sign, since the top positions in its ranking correspond to the most-photographed cities, and those having a higher number of references in Wikipedia and Foursquare.

This year, the restaurant index variable has been included. It seeks to compare the price of the restaurants in the city with those of New York. It is incorporated with a positive sign as an indicator of the international culinary quality.

**Table 8. International Projection Indicators**

No.	Indicator	Description / Unit of measurement	Source
79	Number of passengers per airport	Number of passengers per airport in thousands.	Euromonitor
80	Hotels	Number of hotels per capita.	OpenStreetMap
81	Restaurant index	This index is a comparison of the prices of food and beverages in restaurants and bars in comparison with New York City.	Numbeo
82	McDonald's	Number of McDonald's restaurants per city.	OpenStreetMap
83	Number of conferences and meetings	Number of international conferences and meetings that are held in a city.	International Congress and Convention Association
84	Number of photos of the city uploaded online	Ranking of cities according to the number of photos taken in the city and uploaded online. The top positions correspond to the cities with the most photographs.	Sightsmap



## Technology

Although it is not the only important aspect for cities, information and communications technology (ICT) is part of the backbone of any society that wants to achieve “smart” status.

Technology, an integral dimension of the **CIMI**, is an aspect of society that improves the present quality of life, and its level of development or spread is an indicator of the quality of life achieved or the potential quality of life. In addition, technological development allows cities to be sustainable over time and to maintain or extend the competitive advantages of their production system and the quality of employment. A technologically backward city has comparative disadvantages with respect to other cities, both from the point of view of security, education, and health—all fundamental for the sustainability of society—and from the point of view of the productive apparatus. As a consequence of this, the production functions become anachronistic. Competitiveness, without protectionism, becomes depleted, which has a negative effect on the city’s capacity for consumption and investment, as well as reducing labor productivity.

The indicators selected for measuring the cities’ performance in terms of the reach of technology and growth in the cities are set out in **Table 9** below.

The indicators that represent the number of Twitter and LinkedIn users are grouped into a variable called “social media.” This is incorporated with a positive sign in the **CIMI**, since it shows the degree to which a city’s inhabitants are connected with technology.

The variables showing the percentage of households with internet and mobile phones, as well as the variables for landline and broadband subscriptions, show the degree of technological development that a city has, as they

enable households and businesses to access the means necessary to make efficient use of technology.

For its part, the Innovation Cities Index (ICI) is calculated by carrying out assessments on the basis of various factors regarding technological innovation in cities, in sectors such as health, the economy in general and the population, among others. It is currently the most comprehensive indicator for measuring the degree of development of innovation in cities and is divided methodologically into three aspects or dimensions: cultural assets, human infrastructure and interconnected markets.

The total number of wireless access points represents the connection options available to the city’s inhabitants when they are outside their home. This variable shows the city’s degree of commitment to technological development.

The variables showing percentage of households with some type of telephony, percentage of households with personal computers, internet speed in the city and web index attempt to show, together with the previous ones, the degree of technological penetration in the city.

This year, five new variables have been incorporated: percentage of the population that has at least 3G coverage, use of online banking; percentage of the population covered by at least one LTE/WiMAX mobile network; use of online video calls and percentage of the population that uses the internet away from the home or workplace. All these variables attempt to capture, in a more precise way, the use of new technology in cities.

Because all the indicators of this dimension are directly related to technology, they are shown with a positive sign.

**Table 9. Technology Indicators**

No.	Indicator	Description / Unit of measurement	Source
85	3G coverage	Percentage of the population that has at least 3G coverage.	Euromonitor
86	Innovation index	The Culture of Innovation Index (ICI) is a ranking of the leading cities in innovation.	2thinknow
87	Internet	Percentage of households with access to the internet.	Euromonitor
88	Online banking	Percentage of the population that uses the internet for banking services.	Euromonitor
89	Online video calls	Percentage of the population using the internet for video calls.	Euromonitor
90	LTE/WiMAX	Percentage of the population covered by at least one LTE/WiMAX mobile network.	Euromonitor
91	Mobile phone penetration ratio	Number of landline subscriptions per 100 inhabitants.	International Telecommunication Union
92	Personal computers	Percentage of households in the city with a personal computer.	Euromonitor
93	Social networks	Registered Twitter users by city, in thousands of people + number of registered LinkedIn members.	Twitter and LinkedIn
94	Landline subscriptions	Number of landline subscriptions per 100 inhabitants. IP per capita.	International Telecommunication Union
95	Broadband subscriptions	Broadband subscriptions per 100 inhabitants.	International Telecommunication Union
96	Telephony	Percentage of households with some kind of telephone service.	Euromonitor
97	Mobile telephony	Percentage of households in the city with mobile phones.	Euromonitor
98	Internet usage away from home and/or office	Percentage of the population that uses the internet away from their home or workplace.	Euromonitor
99	Internet speed	Average internet speed in the city in Mbps.	Nomad List
100	Web Index	The Web Index seeks to measure the economic, social and political benefit that countries obtain from the internet.	World Wide Web Foundation
101	Wi-Fi hotspots	Number of wireless access points globally. This variable represents the options available in the city for connecting to the internet.	WiFi Map app



## Limitations of the Indicators

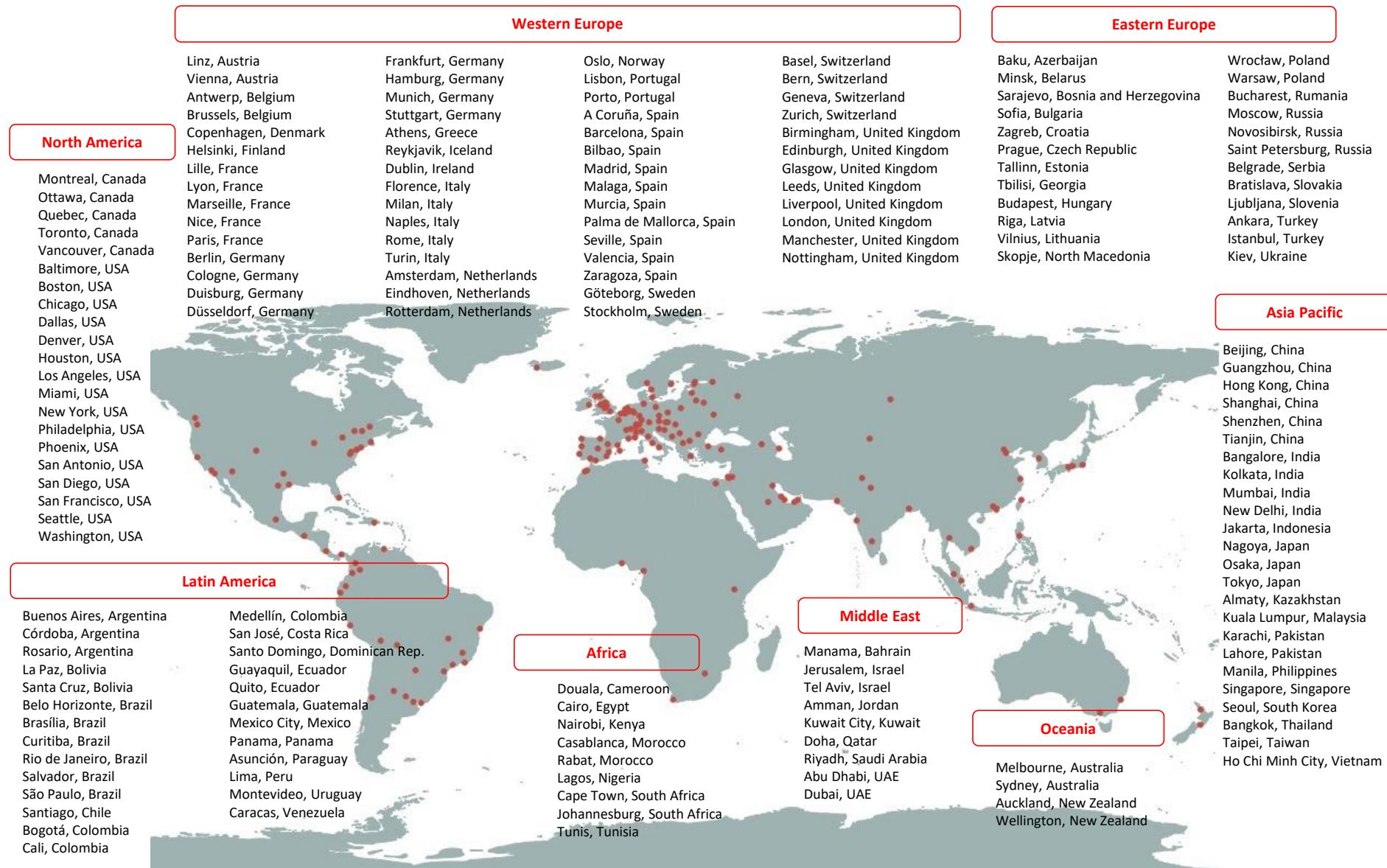
Carrying out an index with the geographical coverage and breadth of dimensions of the **CIMI** poses certain challenges and problems that mean the results must be interpreted with caution. One of the most important limitations of the indicators in the calculation of the **CIMI** is linked to the availability of the data and its comparability. Ideally, our data would come directly from original sources and these sources would also be directly comparable. However, this is not feasible, and we must instead rely on secondary data sources, which—although they have the advantage of offering indicators that are similar between cities—may not have the desired level of precision. Furthermore, the number of variables that we include may be insufficient to capture the complexity of each dimension, and there is sometimes data missing. Despite these limitations, efforts have been made to minimize their impact. Thus, during its development, in the case of those indicators that did not have data for the entire period analyzed, extrapolation techniques were used; in those cases in which indicator values by city were non-existent, but were available by country, individual values were assigned to each city, so that the indicator was related at the country level through some other linked variable, theoretically, at the level of the city; finally, in those cases in which no data were available for a certain city or group of cities for the entire period considered, statistical cluster techniques were used. The scope and detail of these tools are discussed thoroughly in the supplementary report *IESE Cities in Motion. Methodology and Modeling Index 2014*. Also, in **Appendix 1** you can find the list of all the indicators used.

With the **CIMI** platform, we continue to work to obtain more complete and accurate indicators, while we urge cities to allow access to the information they generate, since analyzing it will make it easier to improve those aspects that can be optimized.

## Geographic Coverage

For the calculation of this year's **CIMI**, 174 cities have been included, 79 of which are capitals, with the geographical distribution depicted in **Figure 1**.

**Figure 1. Geographical Distribution of the Cities Included in the Index**





## Cities in Motion. Ranking

The **CIMI** is a synthetic indicator and, as such, is a function based on the partial indicators available.

The process of creating this synthetic indicator is based on a model of weighted aggregation of partial indicators that represent each of the nine dimensions that make up the **CIMI** theoretical model. The dimensions selected to describe the situation of cities in terms of sustainability and the quality of life of their inhabitants, both in the present and in the future, are as follows: governance, urban planning, technology, the environment, international projection, social cohesion, human capital, mobility and transportation, and the economy.

The partial indicators representative of each dimension also correspond to the category of synthetic indicators, which are defined as “weighted aggregations of each of the selected indicators that represent different factors of each dimension.”

Given the type of indicator in question and the data available, for the calculation of the **CIMI**, the DP2 technique has been used, this being the most widely used internationally and the most suitable. Its methodology is based on distance—that is, the difference between an indicator’s given value and another value taken as a reference or target. Likewise, this technique attempts to correct the dependence among the partial indicators, which would artificially increase the indicator’s sensitivity to variations in certain partial values. The correction consists of applying the same factor to each partial indicator, assuming a linearly dependent function is established between them<sup>2</sup>.

Given the partial indicators, the factors are given by the complement of the coefficient of determination ( $R^2$ ) for each indicator compared with the rest of the partial indicators. The order in which the indicators of each dimension have been included, as well as their relative weight in the **CIMI**, is as follows: the economy (1), human capital (0.661), international projection (0.543), urban planning (0.474), the environment (0.820), technology (0.343), governance (0.416), social cohesion (0.488) and mobility and transportation (0.556).

While the order in which each synthetic index of each dimension is incorporated influences the value of the **CIMI**, the sensitivity studies carried out concluded that there are no significant variations in it. More details on the methodology used can be seen in the abovementioned supplementary document *IESE Cities in Motion Index. Methodology and Modeling*.

**Table 10** sets out the **CIMI** city ranking, together with the index value. The cities are grouped according to their performance, measured by the value of the synthetic indicator. Cities with a high performance (H) are considered to be those with an index greater than 90; relatively high (RH), between 60 and 90; average (A), between 45 and 60; and low (L), below 45.

For 2019, it can be seen that 35.63% of the cities (62) have a performance rated high (H) or relatively high (RH), headed by London, New York City, and Paris. There are 61 cities (35.06%) with an average (A) performance, while the performances classified as low (L) include 28.16% (49) of the selected cities. Finally, this year, two of them obtain a very low rating (1.15%).

<sup>2</sup> Because linear estimates are involved, variables with a normal distribution are required, so a log transformation has been applied to some variables in order to obtain the said normality. Likewise, outlier techniques have been applied to avoid bias and overestimations of coefficients.

**Table 10. City Ranking**

Ranking	City	Performance	CIMI	Ranking	City	Performance	CIMI
1	London - United Kingdom	A	100.00	62	Bratislava - Slovakia	RA	60.26
2	New York - USA	A	95.73	63	Stuttgart - Germany	M	59.90
3	Paris - France	RA	85.50	64	Osaka - Japan	M	59.79
4	Tokyo - Japan	RA	81.95	65	Vilnius - Lithuania	M	59.60
5	Reykjavík - Iceland	RA	80.47	66	Glasgow - United Kingdom	M	59.58
6	Copenhagen - Denmark	RA	78.51	67	Rome - Italy	M	59.58
7	Berlin - Germany	RA	77.46	68	Santiago - Chile	M	59.45
8	Amsterdam - Netherlands	RA	77.31	69	Phoenix - USA	M	59.22
9	Singapore - Singapore	RA	76.71	70	Tel Aviv - Israel	M	58.99
10	Hong Kong - China	RA	76.04	71	Manchester - United Kingdom	M	58.97
11	Zurich - Switzerland	RA	75.96	72	San Antonio - USA	M	58.75
12	Oslo - Norway	RA	75.79	73	Birmingham - United Kingdom	M	58.63
13	Chicago - USA	RA	75.04	74	Budapest - Hungary	M	57.87
14	Stockholm - Sweden	RA	75.00	75	Nagoya - Japan	M	57.87
15	Washington - USA	RA	74.32	76	Antwerp - Belgium	M	57.85
16	Los Angeles - USA	RA	74.10	77	Eindhoven - Netherlands	M	57.80
17	Sydney - Australia	RA	74.07	78	Palma de Mallorca - Spain	M	57.74
18	Vienna - Austria	RA	73.84	79	Leeds - United Kingdom	M	57.64
19	Seoul - South Korea	RA	73.67	80	Linz - Austria	M	57.28
20	San Francisco - USA	RA	72.40	81	Seville - Spain	M	56.94
21	Basel - Switzerland	RA	72.22	82	Málaga - Spain	M	56.74
22	Helsinki - Finland	RA	71.96	83	Nice - France	M	56.62
23	Wellington - New Zealand	RA	71.81	84	Beijing - China	M	56.27
24	Munich - Germany	RA	71.73	85	Riga - Latvia	M	56.19
25	Madrid - Spain	RA	71.42	86	Zaragoza - Spain	M	55.87
26	Barcelona - Spain	RA	71.41	87	Moscow - Russia	M	55.74
27	Taipei - Taiwan	RA	70.78	88	Wrocław - Poland	M	55.25
28	Boston - USA	RA	70.71	89	Quebec - Canada	M	54.90
29	Hamburg - Germany	RA	69.17	90	Buenos Aires - Argentina	M	54.71
30	Toronto - Canada	RA	69.17	91	Nottingham - United Kingdom	M	54.48
31	Bern - Switzerland	RA	69.09	92	Dubai - United Arab Emirates	M	54.33
32	Frankfurt - Germany	RA	68.45	93	Marseille - France	M	53.86
33	Dublin - Ireland	RA	67.40	94	Liverpool - United Kingdom	M	53.82
34	Geneva - Switzerland	RA	67.24	95	Duisburg - Germany	M	52.73
35	Auckland - New Zealand	RA	67.19	96	Athens - Greece	M	52.58
36	Lyon - France	RA	66.72	97	Florence - Italy	M	52.51
37	Melbourne - Australia	RA	66.50	98	Zagreb - Croatia	M	52.34
38	Dallas - USA	RA	65.74	99	Ljubljana - Slovenia	M	52.11
39	Prague - Czech Republic	RA	65.36	100	Porto - Portugal	M	52.00
40	Montreal - Canada	RA	65.30	101	Lille - France	M	51.92
41	Brussels - Belgium	RA	64.94	102	A Coruña - Spain	M	51.89
42	Milan - Italy	RA	64.68	103	Bucharest - Romania	M	51.86
43	Ottawa - Canada	RA	64.59	104	Murcia - Spain	M	51.63
44	Vancouver - Canada	RA	64.52	105	Turin - Italy	M	51.58
45	San Diego - USA	RA	64.33	106	Kuala Lumpur - Malaysia	M	51.42
46	Düsseldorf - Germany	RA	64.22	107	Guangzhou - China	M	51.00
47	Edinburgh - United Kingdom	RA	63.94	108	Bilbao - Spain	M	50.67
48	Miami - USA	RA	63.87	109	Shenzhen - China	M	50.44
49	Houston - USA	RA	63.62	110	Montevideo - Uruguay	M	50.38
50	Göteborg - Sweden	RA	63.49	111	Minsk - Belarus	M	50.10
51	Rotterdam - Netherlands	RA	63.48	112	Bangkok - Thailand	M	49.82
52	Lisbon - Portugal	RA	63.38	113	Panama - Panama	M	47.93
53	Seattle - USA	RA	63.32	114	San José - Costa Rica	M	47.56
54	Warsaw - Poland	RA	62.93	115	Kiev - Ukraine	M	47.55
55	Tallinn - Estonia	RA	62.71	116	Sofia - Bulgaria	M	47.29
56	Cologne - Germany	RA	62.58	117	Abu Dhabi - United Arab Emirates	M	46.92
57	Philadelphia - USA	RA	62.39	118	Tbilisi - Georgia	M	46.68
58	Shanghai - China	RA	62.38	119	Naples - Italy	M	46.06
59	Denver - USA	RA	62.14	120	Bogotá - Colombia	M	45.80
60	Valencia - Spain	RA	61.82	121	Jerusalem - Israel	M	45.54
61	Baltimore - USA	RA	60.47	122	Belgrade - Serbia	M	45.42

**Table 10. City Ranking (continued)**

Ranking	City	Performance	CIMI	Ranking	City	Performance	CIMI
123	São Paulo - Brazil	M	45.01	149	Amman - Jordan	B	35.26
124	Saint Petersburg - Russia	B	44.78	150	Santa Cruz - Bolivia	B	35.26
125	Doha - Qatar	B	43.86	151	Johannesburg - South Africa	B	34.56
126	Medellín - Colombia	B	43.81	152	Tunis - Tunisia	B	34.44
127	Ho Chi Minh City - Vietnam	B	43.61	153	Sarajevo - Bosnia-Herzegovina	B	34.35
128	Almaty - Kazakhstan	B	43.08	154	Nairobi - Kenya	B	34.32
129	Istanbul - Turkey	B	43.03	155	Lima - Peru	B	34.23
130	Mexico City - Mexico	B	42.86	156	Belo Horizonte - Brazil	B	33.89
131	Asunción - Paraguay	B	42.34	157	Salvador - Brazil	B	33.87
132	Rio de Janeiro - Brazil	B	42.26	158	Guatemala City - Guatemala	B	33.74
133	Jakarta - Indonesia	B	42.26	159	Novosibirsk - Russia	B	33.53
134	Rosario - Argentina	B	41.70	160	Manama - Bahrain	B	33.18
135	Brasília - Brazil	B	40.92	161	Mumbai - India	B	32.45
136	Ankara - Turkey	B	40.56	162	New Delhi - India	B	32.15
137	Santo Domingo - Dominican Republic	B	40.39	163	Casablanca - Morocco	B	31.71
138	Curitiba - Brazil	B	39.79	164	Guayaquil - Ecuador	B	31.55
139	Córdoba - Argentina	B	39.00	165	Manila - Philippines	B	29.56
140	Baku - Azerbaijan	B	38.88	166	Rabat - Morocco	B	29.45
141	Skopje - North Macedonia	B	38.15	167	Riyadh - Saudi Arabia	B	29.34
142	Quito - Ecuador	B	37.64	168	Cairo - Egypt	B	26.89
143	Cape Town - South Africa	B	37.27	169	Kolkata - India	B	26.35
144	Kuwait City - Kuwait	B	37.15	170	Douala - Cameroon	B	22.58
145	Cali - Colombia	B	37.02	171	Lagos - Nigeria	B	18.13
146	Bangalore - India	B	36.17	172	Lahore - Pakistan	B	13.76
147	La Paz - Bolivia	B	35.88	173	Karachi - Pakistan	MB	10.39
148	Tianjin - China	B	35.75	174	Caracas - Venezuela	MB	4.15



## Cities in Motion: Ranking by Dimension

This section sets out the ranking according to each of the dimensions that make up the index, together with the city's position overall and for each dimension. In order to provide a visually more intuitive layout, the darker greens correspond to the top positions in the **CIMI** ranking, and the darker reds to the worst-ranked cities, while yellow shades reflect the intermediate positions. The intermediate positions are highlighted in yellow.

The ranking is topped by London and New York, two highly developed smart cities. This year it is London, (United Kingdom) in first place in the overall ranking, thanks to its performance in the dimensions of international projection (position 1), human capital (position 1), governance (position 2), urban planning (position 2), mobility and transportation (position 3), technology (position 6). However, this city does not show such a good performance in the dimensions of social cohesion (position 64) and the environment (position 35). It should be made clear that, although it is not in a prominent position in these dimensions, each year it shows an improvement, consistent with the work being done to turn it into a smart city, in every sense, and to improve its overall position.

Meanwhile, New York City (United States) is in second place in the overall ranking, thanks to its performance in the dimensions of the economy (position 1), urban planning (position 1), mobility and transportation (position 1) human capital (position 3). The metropolis has a poor performance in social cohesion (position 151) and the environment (position 69), aspects that its rulers have set out to improve by 2050.

Third in the overall ranking is Paris. It is a city with a very good performance in mobility and transportation, as well as in international projection, ranking 2nd in both dimensions. It also occupies a prominent position in human capital, the economy and urban planning.

**Table 11** shows both the overall ranking and the ranking by dimension for the 174 cities included in the index. The interpretation of the table is very important for the analysis of the results, since the relative position of all cities in each of the dimensions can be observed. **Figure 2**, below, shows the positions of these cities on the world map.

**Table 11. Ranking by Dimension**

City	Cities in Motion	Economy	Human capital	Social cohesion	Environment	Governance	Urban planning	International projection	Technology	Mobility and Transportation
London - United Kingdom	1	14	1	64	35	2	2	1	6	3
New York - USA	2	1	3	151	69	30	1	6	8	1
Paris - France	3	13	6	74	48	44	12	2	20	2
Tokyo - Japan	4	3	9	51	6	26	23	30	22	56
Reykjavík - Iceland	5	86	22	14	1	25	125	16	58	57
Copenhagen - Denmark	6	19	46	13	2	7	81	18	21	29
Berlin - Germany	7	59	5	73	42	15	36	9	18	4
Amsterdam - Netherlands	8	26	43	50	24	32	24	5	14	11
Singapore - Singapore	9	41	38	28	7	22	21	3	2	55
Hong Kong - China	10	30	13	111	19	17	35	4	1	71
Zurich - Switzerland	11	21	33	2	27	4	74	20	24	46
Oslo - Norway	12	15	54	24	10	14	73	22	31	35
Chicago - USA	13	8	10	135	136	46	3	19	17	38
Stockholm - Sweden	14	35	48	70	5	23	61	28	7	15
Washington - USA	15	6	7	98	142	18	9	49	11	49
Los Angeles - USA	16	2	2	96	154	9	19	33	15	125
Sydney - Australia	17	29	16	30	23	24	33	7	39	95
Vienna - Austria	18	69	20	57	15	49	41	8	45	7
Seoul - South Korea	19	11	14	68	41	36	31	36	26	34
San Francisco - USA	20	4	11	106	128	68	17	35	3	60
Basel - Switzerland	21	18	45	1	37	16	109	60	42	30
Helsinki - Finland	22	32	53	8	9	6	52	47	86	50
Wellington - New Zealand	23	28	63	6	4	13	34	83	30	80
Munich - Germany	24	36	57	11	77	42	59	21	28	6
Madrid - Spain	25	66	41	38	53	55	30	11	49	5
Barcelona - Spain	26	80	42	67	46	29	11	14	47	9
Taipei - Taiwan	27	81	24	3	117	5	7	51	13	19
Boston - USA	28	9	4	90	116	20	25	68	5	147
Hamburg - Germany	29	44	28	65	59	27	43	50	37	12

**Table 11. Ranking by Dimension (continued)**

City	Cities in Motion	Economy	Human capital	Social cohesion	Environment	Governance	Urban planning	International projection	Technology	Mobility and Transportation
Toronto - Canada	30	38	32	59	55	19	8	25	57	93
Bern - Switzerland	31	54	58	4	67	1	83	128	32	45
Frankfurt - Germany	32	45	64	42	78	70	18	29	50	17
Dublin - Ireland	33	16	103	39	28	79	106	27	55	76
Geneva - Switzerland	34	27	79	29	68	3	124	17	27	88
Auckland - New Zealand	35	31	95	26	16	34	65	44	43	103
Lyon - France	36	61	26	32	62	33	47	54	66	26
Melbourne - Australia	37	34	55	45	31	11	39	64	40	128
Dallas - USA	38	7	12	108	133	66	49	74	52	73
Prague - Czech Republic	39	88	37	22	30	35	90	23	79	44
Montreal - Canada	40	56	60	44	56	40	13	45	98	63
Brussels - Belgium	41	53	112	63	43	50	58	38	62	16
Milan - Italy	42	71	39	87	65	104	29	34	82	14
Ottawa - Canada	43	58	49	19	61	10	10	92	103	101
Vancouver - Canada	44	50	93	36	70	69	5	58	69	90
San Diego - USA	45	22	35	94	141	12	54	55	16	77
Düsseldorf - Germany	46	49	84	23	33	100	112	53	67	18
Edinburgh - United Kingdom	47	57	27	7	79	85	94	32	34	72
Miami - USA	48	20	23	122	148	57	42	12	48	105
Houston - USA	49	5	47	117	152	65	16	40	38	132
Göteborg - Sweden	50	43	82	85	12	45	107	98	23	43
Rotterdam - Netherlands	51	75	68	43	45	107	15	106	29	23
Lisbon - Portugal	52	96	74	61	11	78	111	26	71	37
Seattle - USA	53	10	61	99	146	28	51	65	9	111
Warsaw - Poland	54	76	72	47	99	8	14	56	106	47
Tallinn - Estonia	55	62	25	31	17	133	48	95	68	83
Cologne - Germany	56	52	52	27	107	38	108	67	36	33
Philadelphia - USA	57	12	18	127	134	51	37	89	25	118
Shanghai - China	58	42	29	72	149	87	53	46	111	10

**Table 11. Ranking by Dimension (continued)**

City	Cities in Motion	Economy	Human capital	Social cohesion	Environment	Governance	Urban planning	International projection	Technology	Mobility and Transportation
Denver - USA	59	17	36	119	159	62	22	48	10	64
Valencia - Spain	60	89	111	41	39	37	32	110	70	20
Baltimore - USA	61	24	51	132	129	47	60	93	35	65
Bratislava - Slovakia	62	97	31	9	32	31	45	111	138	74
Stuttgart - Germany	63	87	66	20	71	88	92	88	46	28
Osaka - Japan	64	39	73	88	21	117	79	112	61	87
Vilnius - Lithuania	65	73	17	138	26	58	88	90	74	82
Glasgow - United Kingdom	66	65	70	18	89	53	85	59	63	106
Rome - Italy	67	78	40	118	119	63	121	13	88	40
Santiago - Chile	68	103	97	80	29	94	40	62	94	42
Phoenix - USA	69	23	19	124	140	76	71	102	41	100
Tel Aviv - Israel	70	51	128	37	34	71	38	100	89	81
Manchester - United Kingdom	71	55	50	58	105	80	69	78	44	79
San Antonio - USA	72	25	44	107	138	64	55	86	75	99
Birmingham - United Kingdom	73	60	59	89	80	60	57	94	59	85
Budapest - Hungary	74	135	34	105	49	56	120	39	105	31
Nagoya - Japan	75	63	90	52	13	106	87	137	56	113
Antwerp - Belgium	76	121	100	33	73	82	20	114	54	36
Eindhoven - Netherlands	77	68	89	21	103	61	67	138	19	86
Palma de Mallorca - Spain	78	95	113	48	85	114	98	10	81	51
Leeds - United Kingdom	79	64	69	16	86	75	84	139	65	75
Linz - Austria	80	79	88	10	38	95	113	158	95	39
Seville - Spain	81	102	94	81	64	89	46	96	100	32
Málaga - Spain	82	107	99	55	82	108	99	61	101	21
Nice - France	83	72	91	83	75	97	126	43	92	61
Beijing - China	84	40	87	101	162	122	80	42	110	8
Riga - Latvia	85	139	56	84	22	102	28	87	113	69
Zaragoza - Spain	86	90	62	49	90	90	104	151	84	25
Moscow - Russia	87	148	8	150	135	52	6	71	119	91

**Table 11. Ranking by Dimension (continued)**

City	Cities in Motion	Economy	Human capital	Social cohesion	Environment	Governance	Urban planning	International projection	Technology	Mobility and Transportation
Wrocław - Poland	88	93	81	60	100	98	56	131	116	27
Quebec - Canada	89	110	76	12	76	21	91	121	128	108
Buenos Aires - Argentina	90	166	65	139	25	41	26	31	114	123
Nottingham - United Kingdom	91	70	83	25	122	81	101	126	53	116
Dubai - United Arab Emirates	92	48	151	17	161	54	100	24	4	109
Marseille - France	93	122	92	77	95	72	82	84	97	48
Liverpool - United Kingdom	94	117	78	5	113	84	97	119	51	110
Duisburg - Germany	95	131	85	35	108	112	144	63	72	54
Athens - Greece	96	109	71	148	57	148	142	52	83	41
Florence - Italy	97	99	21	114	132	127	131	70	91	52
Zagreb - Croatia	98	126	105	71	36	39	130	127	93	94
Ljubljana - Slovenia	99	138	101	40	50	91	115	125	73	92
Porto - Portugal	100	111	116	54	18	101	157	73	102	119
Lille - France	101	74	102	78	91	113	114	141	99	67
A Coruña - Spain	102	92	96	69	60	140	77	162	87	68
Bucharest - Romania	103	105	98	91	112	131	138	77	33	58
Murcia - Spain	104	101	109	53	96	115	72	165	64	59
Turin - Italy	105	98	80	86	137	109	134	107	108	24
Kuala Lumpur - Malaysia	106	83	121	115	114	139	78	57	107	53
Guangzhou - China	107	46	134	93	143	151	95	81	126	22
Bilbao - Spain	108	91	117	62	87	118	93	113	78	96
Shenzhen - China	109	37	144	104	131	159	127	122	121	13
Montevideo - Uruguay	110	144	133	110	3	74	118	115	133	114
Minsk - Belarus	111	124	86	76	58	103	123	154	104	84
Bangkok - Thailand	112	125	129	116	121	152	27	15	109	117
Panama - Panama	113	84	145	103	40	149	50	80	151	140
San José - Costa Rica	114	123	155	112	14	77	132	101	132	144
Kiev - Ukraine	115	133	104	160	123	93	4	117	152	124
Sofia - Bulgaria	116	162	77	66	88	59	153	104	118	104

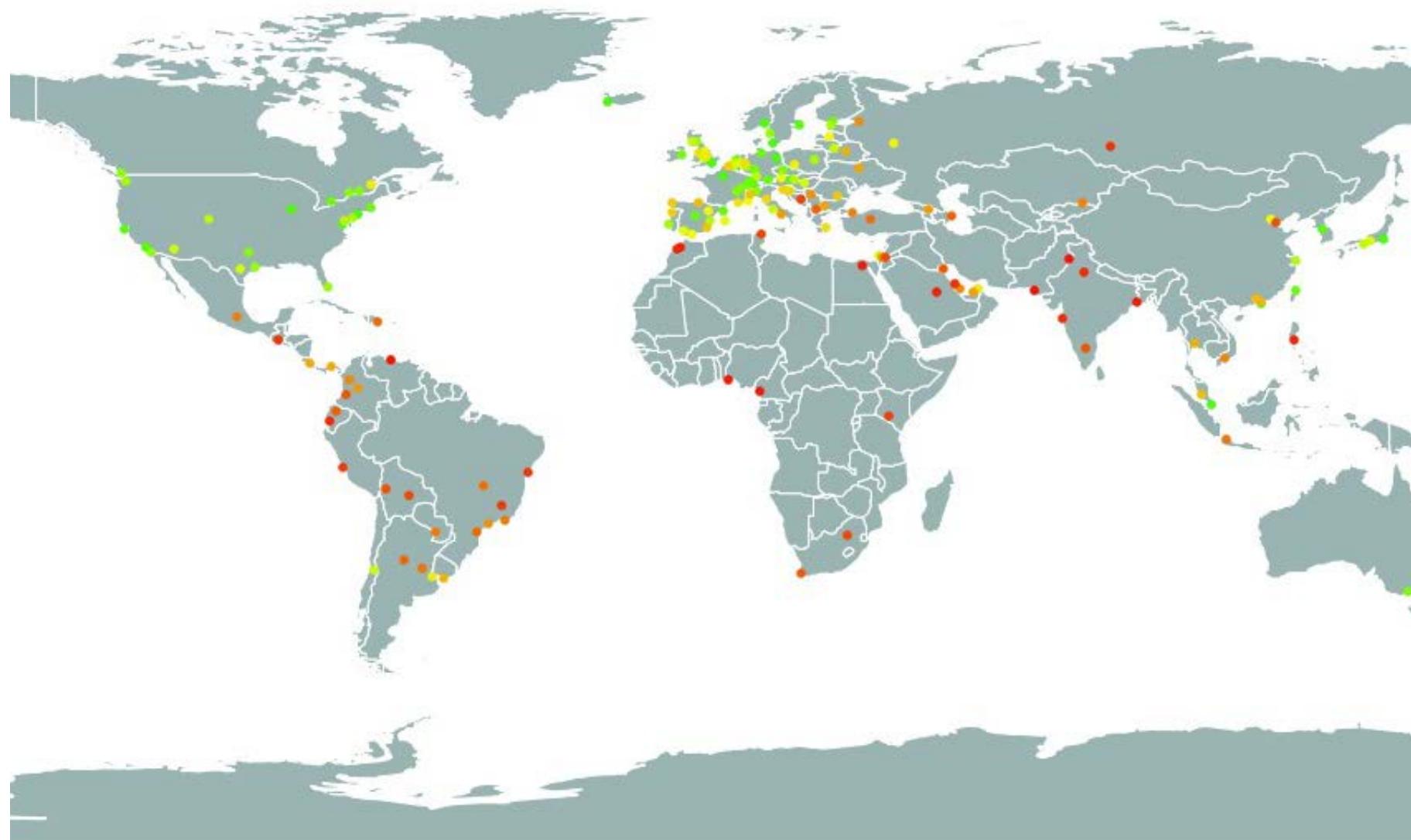
**Table 11. Ranking by Dimension (continued)**

City	Cities in Motion	Economy	Human capital	Social cohesion	Environment	Governance	Urban planning	International projection	Technology	Mobility and Transportation
Abu Dhabi - United Arab Emirates	117	33	161	15	169	83	137	79	12	127
Tbilisi - Georgia	118	85	138	131	93	48	119	129	96	149
Naples - Italy	119	116	108	130	111	145	110	108	117	98
Bogotá - Colombia	120	112	110	162	92	43	155	75	124	122
Jerusalem - Israel	121	129	136	152	51	67	152	66	115	143
Belgrade - Serbia	122	113	106	143	83	124	162	103	77	138
São Paulo - Brazil	123	137	123	156	102	121	76	41	139	126
Saint Petersburg - Russia	124	168	30	128	155	73	44	82	122	137
Doha - Qatar	125	47	164	34	166	147	105	76	76	142
Medellín - Colombia	126	115	132	140	110	99	141	142	136	78
Ho Chi Minh City - Vietnam	127	142	156	125	63	158	68	97	125	107
Almaty - Kazakhstan	128	108	124	134	104	150	75	169	141	112
Istanbul - Turkey	129	132	125	165	139	142	116	37	90	97
Mexico City - Mexico	130	127	67	142	168	92	63	72	153	66
Asunción - Paraguay	131	158	107	75	8	146	163	161	167	135
Rio de Janeiro - Brazil	132	151	114	164	106	105	64	69	142	155
Jakarta - Indonesia	133	154	15	145	125	125	103	91	123	174
Rosario - Argentina	134	171	120	82	84	116	96	144	131	146
Brasília - Brazil	135	146	150	155	74	120	150	124	145	62
Ankara - Turkey	136	153	115	97	144	136	117	146	130	115
Santo Domingo - Dominican Republic	137	120	169	154	44	144	62	140	155	159
Curitiba - Brazil	138	156	148	147	52	143	135	148	148	89
Córdoba - Argentina	139	167	127	100	72	130	147	147	134	156
Baku - Azerbaijan	140	149	122	123	98	160	122	135	146	148
Skopje - North Macedonia	141	160	149	113	115	111	160	149	127	129
Quito - Ecuador	142	164	126	56	97	166	151	116	157	139
Cape Town - South Africa	143	150	140	171	130	96	66	105	140	162
Kuwait City - Kuwait	144	169	158	92	150	135	139	118	60	136
Cali - Colombia	145	118	130	146	118	132	169	160	143	152

**Table 11. Ranking by Dimension (continued)**

City	Cities in Motion	Economy	Human capital	Social cohesion	Environment	Governance	Urban planning	International projection	Technology	Mobility and Transportation
Bangalore - India	146	82	131	141	165	119	128	109	159	169
La Paz - Bolivia	147	155	152	126	66	155	140	150	166	154
Tianjin - China	148	67	139	79	172	161	129	166	137	70
Amman - Jordan	149	140	172	120	120	129	158	130	154	165
Santa Cruz - Bolivia	150	152	146	109	20	172	170	164	164	157
Johannesburg - South Africa	151	147	142	172	153	126	70	120	135	158
Tunis - Tunisia	152	163	153	136	81	141	166	153	150	151
Sarajevo - Bosnia-Herzegovina	153	173	75	153	126	164	156	159	129	120
Nairobi - Kenya	154	119	167	167	54	123	86	143	169	173
Lima - Peru	155	143	135	129	147	134	148	145	163	167
Belo Horizonte - Brazil	156	159	141	157	109	154	159	163	149	121
Salvador - Brazil	157	157	137	159	94	153	145	136	162	160
Guatemala City - Guatemala	158	145	160	149	127	138	149	133	165	164
Novosibirsk - Russia	159	172	118	137	158	128	89	167	144	133
Manama - Bahrain	160	104	157	46	167	168	165	134	120	141
Mumbai - India	161	94	162	161	164	137	102	123	156	168
Delhi - India	162	77	159	168	170	110	161	85	160	102
Casablanca - Morocco	163	128	166	144	156	169	167	155	85	134
Guayaquil - Ecuador	164	165	154	95	124	170	164	152	161	150
Manila - Philippines	165	161	147	158	145	165	154	99	147	171
Rabat - Morocco	166	134	174	121	151	163	173	170	112	145
Riyadh - Saudi Arabia	167	100	165	102	173	86	172	156	80	161
Cairo - Egypt	168	130	143	170	160	167	143	157	158	170
Kolkata - India	169	114	163	166	157	156	136	171	168	172
Douala - Cameroon	170	170	168	133	47	173	168	172	173	163
Lagos - Nigeria	171	141	170	169	163	157	133	173	174	166
Lahore - Pakistan	172	136	173	173	171	171	174	168	171	131
Karachi - Pakistan	173	106	171	163	174	174	171	174	170	153
Caracas - Venezuela	174	174	119	174	101	162	146	132	172	130

**Figure 2. Map of Cities in the CIMI Ranking**



**Table 12** below shows the top 10 positions in the ranking for each dimension. In this way, the regional representativeness can be better visualized in each of the dimensions.

**Table 12. Top 10 by Dimension**

ECONOMY	HUMAN CAPITAL	SOCIAL COHESION
<b>1</b> New York - USA <b>2</b> Los Angeles - USA <b>3</b> Tokyo - Japan <b>4</b> San Francisco - USA <b>5</b> Houston - USA <b>6</b> Washington - USA <b>7</b> Dallas - USA <b>8</b> Chicago - USA <b>9</b> Boston - USA <b>10</b> Seattle - USA	<b>1</b> London - United Kingdom <b>2</b> Los Angeles - USA <b>3</b> New York - USA <b>4</b> Boston - USA <b>5</b> Berlin - Germany <b>6</b> Paris - France <b>7</b> Washington - USA <b>8</b> Moscow - Russia <b>9</b> Tokyo - Japan <b>10</b> Chicago - USA	<b>1</b> Basel - Switzerland <b>2</b> Zurich - Switzerland <b>3</b> Taipei - Taiwan <b>4</b> Bern - Switzerland <b>5</b> Liverpool - United Kingdom <b>6</b> Wellington - New Zealand <b>7</b> Edinburgh - United Kingdom <b>8</b> Helsinki - Finland <b>9</b> Bratislava - Slovakia <b>10</b> Linz - Austria

Although the indexes are not comparable from edition to edition, New York City (United States) continues to come top in the ranking for this dimension, thanks especially to its high GDP and to the number of headquarters of publicly traded companies. Although its indicators make this metropolis hard to beat at the moment, Los Angeles and Tokyo are following hard on its heels.

The top 10 of this dimension are consist almost entirely (with the exception of Tokyo) of American cities, due mainly to their high GDP per capita and the growth shown in recent years.

The city that ranks first in this dimension is London (United Kingdom), which achieves this position owing to having the most top-level business schools, as well as the highest number of universities in the top 500 worldwide. It also has a large number of secondary schools, both state-run and private, and a high proportion of the population with secondary and higher education, as well as a broad cultural offering of theaters, museums and art galleries.

US cities also stand out in this dimension. In fact, there are five of them in the top 10, together with three European ones.

The city with the highest rating in this dimension is Basel (Switzerland). Considered to be one of the ten with the best quality of life in the world in 2019 (Quality of Life Index, Mercer), it is a city with a fairly equal income distribution, low unemployment and a low crime and homicide rate. It has one of the highest happiness rates in the world and the maximum rating as a favorable environment for women's development. In this dimension, there are seven European cities among the top 10 in the ranking, three of which are Swiss.

**Table 12. Top 10 by dimension (continued)**

		
<p><b>ENVIRONMENT</b></p> <ol style="list-style-type: none"> <li><b>1</b> Reykjavík - Iceland</li> <li><b>2</b> Copenhagen - Denmark</li> <li><b>3</b> Montevideo - Uruguay</li> <li><b>4</b> Wellington - New Zealand</li> <li><b>5</b> Stockholm - Sweden</li> <li><b>6</b> Tokyo - Japan</li> <li><b>7</b> Singapore - Singapore</li> <li><b>8</b> Asunción - Paraguay</li> <li><b>9</b> Helsinki - Finland</li> <li><b>10</b> Oslo - Norway</li> </ol>	<p><b>GOVERNANCE</b></p> <ol style="list-style-type: none"> <li><b>1</b> Bern - Switzerland</li> <li><b>2</b> London - United Kingdom</li> <li><b>3</b> Geneva - Switzerland</li> <li><b>4</b> Zurich - Switzerland</li> <li><b>5</b> Taipei - Taiwan</li> <li><b>6</b> Helsinki - Finland</li> <li><b>7</b> Copenhagen - Denmark</li> <li><b>8</b> Warsaw - Poland</li> <li><b>9</b> Los Angeles - USA</li> <li><b>10</b> Ottawa - Canada</li> </ol>	<p><b>URBAN PLANNING</b></p> <ol style="list-style-type: none"> <li><b>1</b> New York - USA</li> <li><b>2</b> London - United Kingdom</li> <li><b>3</b> Chicago - USA</li> <li><b>4</b> Kiev - Ukraine</li> <li><b>5</b> Vancouver - Canada</li> <li><b>6</b> Moscow - Russia</li> <li><b>7</b> Taipei - Taiwan</li> <li><b>8</b> Toronto - Canada</li> <li><b>9</b> Washington - USA</li> <li><b>10</b> Ottawa - Canada</li> </ol>

In this dimension, the best positioned city is Reykjavík (Iceland), followed by Copenhagen (Denmark). They are both in the top positions of the EPI and have low levels of PM<sub>10</sub> and PM<sub>2.5</sub> pollution and contamination. The Icelandic capital also stands out for its renewable water and energy sources. In the top 10 of the ranking, two Latin American cities are worthy of mention: Montevideo (Uruguay), for its low PM<sub>2.5</sub> contamination, and Asunción (Paraguay), for registering the lowest level of CO<sub>2</sub> emission.

Ranked first in this dimension is Bern (Switzerland), displaying a good performance in the indexes of corruption perception, per capita reserves and number of embassies. Among the top ten ranked cities are five other cities Western European cities and two North American ones.

This year, New York City, the city with the most skyscrapers and buildings, takes first place in this dimension. It stands out for its highly developed infrastructures, with a large number of buildings and skyscrapers and a highly developed system for renting or sharing bicycles. Also noteworthy in this dimension is that six of the top ten cities are in North America, including three in Canada.

**Table 12. Top 10 by dimension (continued)**

		
<b>INTERNATIONAL PROJECTION</b>	<b>TECHNOLOGY</b>	<b>MOBILITY AND TRANSPORTATION</b>
<b>1</b> London - United Kingdom <b>2</b> Paris - France <b>3</b> Singapore - Singapore <b>4</b> Hong Kong - China <b>5</b> Amsterdam - Netherlands <b>6</b> New York - USA <b>7</b> Sydney - Australia <b>8</b> Vienna - Austria <b>9</b> Berlin - Germany <b>10</b> Palma de Mallorca - Spain	<b>1</b> Hong Kong - China <b>2</b> Singapore - Singapore <b>3</b> San Francisco - USA <b>4</b> Dubai - United Arab Emirates <b>5</b> Boston - USA <b>6</b> London - United Kingdom <b>7</b> Stockholm - Sweden <b>8</b> New York - USA <b>9</b> Seattle - USA <b>10</b> Denver - USA	<b>1</b> New York - USA <b>2</b> Paris - France <b>3</b> London - United Kingdom <b>4</b> Berlin - Germany <b>5</b> Madrid - Spain <b>6</b> Munich - Germany <b>7</b> Vienna - Austria <b>8</b> Beijing - China <b>9</b> Barcelona - Spain <b>10</b> Shanghai - China

The city leading the international projection category is London, with Paris and Singapore occupying second and third position, respectively. London stands out for its significant number of hotels and the number of international conferences it organizes. In addition, it has the largest number of airline passengers, which is consistent with its having the largest number of air routes. Paris, meanwhile, has a performance very similar to that of the British capital in terms of its number of hotels and is one of the cities holding the highest number of international congresses.

The top 10 cities of this dimension are mainly European (six), with two Asian, one North American and one from Oceania. Palma de Mallorca stands out in 10th place.

This year Hong Kong (China) occupies the first place in this dimension, followed by Singapore, which is ranked second. Hong Kong is noteworthy for its high internet index and the number of mobile phones per capita, with 99.6% of its population owning at least one. With respect to the new variables added this year, 99.9% of the population has 3G coverage or higher on their mobile devices and 99.8% of the population has at least one LTE/WiMAX mobile network available.

In Singapore, on the other hand, everything revolves around technology. This city offers high speed internet to its citizens throughout its territory. Its people have an average of three mobile phones for every two inhabitants and practically one hundred percent have some form of mobile telephony. It has a prominent position in the innovation index (ICI), and has a large number of global Wi-Fi access points. Among the cities that occupy the top ten positions, there are also five North American and two European ones.

The top ranked city in this dimension is New York. It has a highly developed metro system, with the largest number of stations. It also has a good rental system for bicycles, scooters and mopeds, and is the fifth city in number of incoming air routes. In second place is Paris, which is the second in terms of incoming air routes and has a well-developed bicycle sharing system. Another six European and two Asian cities are ranked in the top 10 positions for this dimension.



**"The resilience of cities will acquire unprecedented relevance in urban agendas, but it will only be possible to achieve it if all social actors—the public sector, private companies, civic organizations and academic institutions—contribute and collaborate to achieve this common objective."**

Pascual Berrone

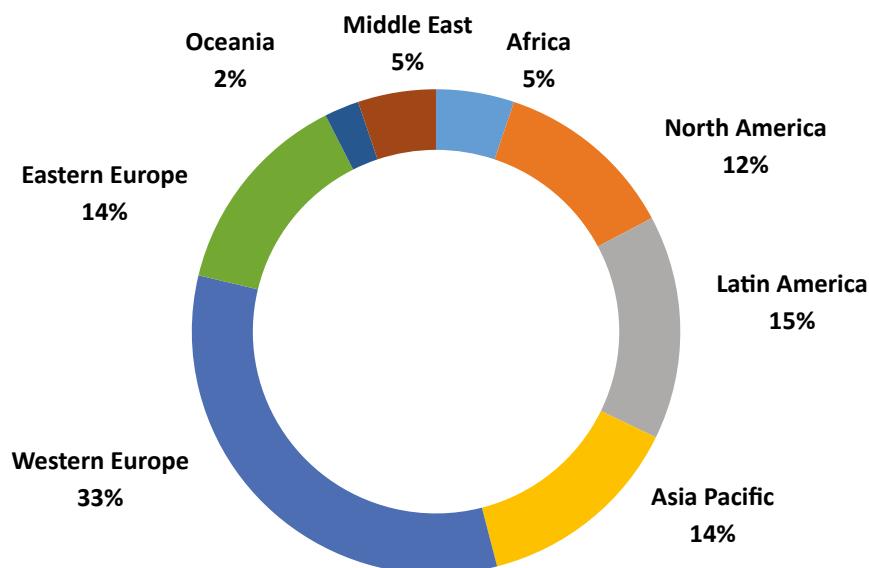


## Cities in Motion. Regional Distribution

This section includes an analysis by geographic region. One of the limitations of our index is the unequal coverage given to all the regions, due fundamentally to the scarcity of information available in certain areas for cities that are not capitals or do not have a significant population. Despite this limitation, each new edition of the **CIMI** attempts to widen the current coverage in a more equitable way, if new information is available.

**Figure 3** shows the extent to which each region is represented in the ranking. As can be seen, 33% of the cities considered are from Western Europe, the most represented region; Latin America is next, with 15%, followed by Asia Pacific and Eastern Europe with 14% each.

**Figure 3. Percentage of Cities From Each Geographical Region in the CIMI**

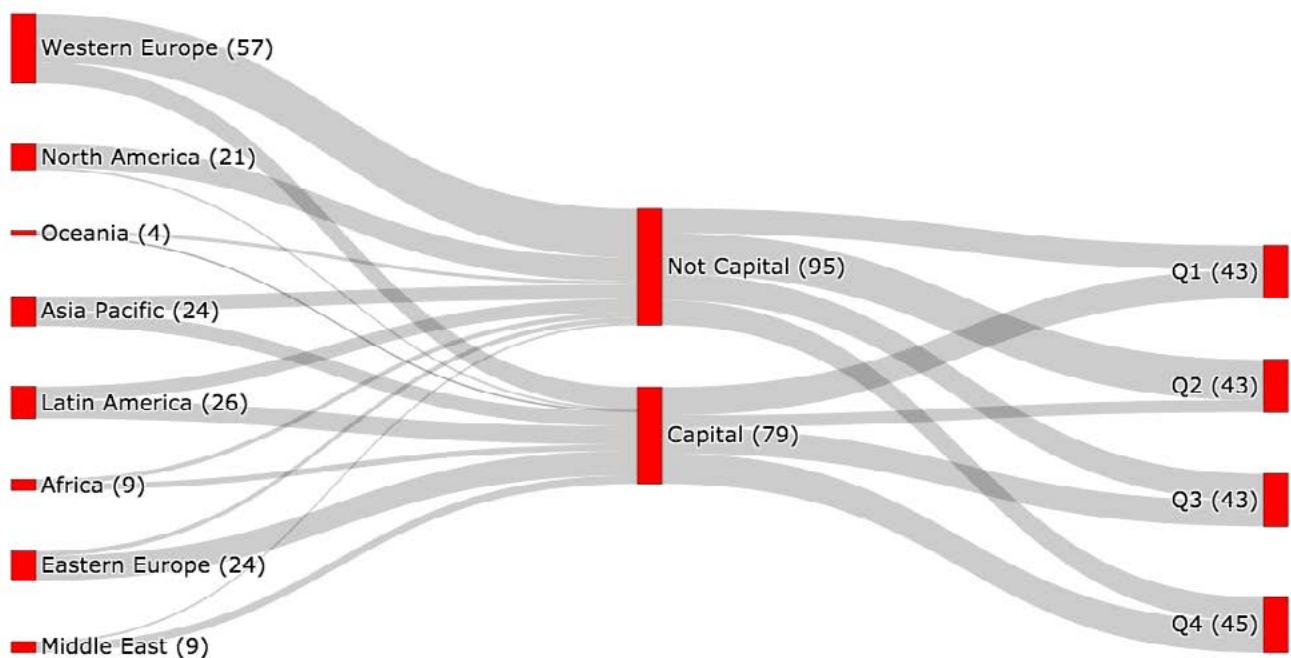


**Figure 4** below shows the distribution of cities by geographic region (left), whether or not they are national capitals (center) and their position in the ranking (right). Grouping by ranking is defined according to groups Q1, Q2, Q3 and Q4. The Q1 group comprises the 25% highest ranked cities and the Q4 group comprises the 25% worst performing ones. As can be seen, the most represented region is Western Europe, with 57 cities, or 33% of those included in the ranking. It is followed by Latin America, with 26 cities (15% of the total), and Asia Pacific and Eastern Europe, with 24 each, or 14% of the total. From the figure, it can be deduced that most cities in Western

Europe and North America are not national capitals, contrary to the situation in Eastern Europe and the Middle East, where most of those included in the ranking are capitals cities.

Finally, the group of cities that are not national capitals have greater representation in group Q2, which are those that occupy positions 44 to 87 of the **CIMI** ranking.

**Figure 4**



# Cities in Motion. Regional Ranking

Below are the tables of the top five cities in each territory and their evolution in the global ranking of the past three years. Each map shows the cities of the region with the corresponding position that each city occupies in the territory. The colors refer to their position in the overall ranking.

## Africa Top 5

City	Regional position	Global position 2017	Global position 2018	Global position 2019
Cape Town, South Africa	1	139	144	143
Johannesburg, South Africa	2	159	161	151
Tunis, Tunisia	3	158	155	152
Nairobi, Kenya	4	153	147	154
Casablanca, Morocco	5	161	162	163



The Africa ranking is headed by Cape Town, followed by Johannesburg. Tunis, Nairobi and Casablanca complete the list of the five best cities in the region. It is worth noting that all of the African cities included in the index are among the lowest positions in the overall ranking.

## North America Top 5

City	Regional position	Global position 2017	Global position 2018	Global position 2019
New York City, United States	1	2	2	2
Chicago, United States	2	18	13	13
Washington, United States	3	15	20	15
Los Angeles, United States	4	13	17	16
San Francisco, United States	5	16	19	20



New York leads the North America ranking and is also in second position in the overall classification. It is followed this year by Chicago, in position 13, ahead of Los Angeles. Washington, Los Angeles, and San Francisco complete the top five cities in the region. Moreover, the top 5 in the region is made up solely of US cities.

As already mentioned and as can be seen in the above table, North American cities occupy some of the top places in the overall ranking. In the case of US cities, six of the sixteen included in the study are among the top 30 in the overall ranking. They stand out especially in the economy dimension, since all of them are among the top twenty-five.

## Latin America Top 5

City	Regional position	Global position 2017	Global position 2018	Global position 2019
Santiago, Chile	1	85	75	68
Buenos Aires, Argentina	2	87	94	90
Montevideo, Uruguay	3	109	108	110
Panama City, Panama	4	116	116	113
San José, Costa Rica	5	113	115	114



Over the years, the leadership of this region has been shared between the top two cities. In this edition, Santiago (Chile) overtakes Buenos Aires (Argentina) and is one of the top 30 in the environment dimension. For its part, the Argentinian capital is in the top 30 for urban planning and the environment, but its progress in the economy dimension places it well below Santiago in the overall ranking. Montevideo, Panama City and San José also stand out in the region.

As can be seen in the table and in the above map, most of the Latin American cities are below position 100 in the overall ranking, with the exception of Santiago and Buenos Aires. Latin America is one of the regions with the greatest urban concentration on the planet, so the challenges facing these cities are increasingly global, with problems common to all of them.

## Asia-Pacific Top 5

City	Regional position	Global position 2017	Global position 2018	Global position 2019
Tokyo, Japan	1	5	5	4
Singapore, Singapore	2	8	6	9
Hong Kong, China	3	27	14	10
Seoul, South Korea	4	10	15	19
Taipei, Taiwan	5	28	26	27



Tokyo leads the ranking in the Asia-Pacific region and is ranked fourth overall. The Japanese capital stands out particularly in the dimensions of the economy (position 3), the environment (position 6), and human capital (position 9). The second city in this classification is Singapore, which occupies the ninth place overall. This city-state stands out in the dimensions of technology, international projection and environment, and is one of the top 10 in each of these three dimensions. Completing the regional ranking are Hong Kong, Seoul and Taipei.

## Western Europe Top 5

City	Regional position	Global position 2017	Global position 2018	Global position 2019
London, United Kingdom	1	1	1	1
Paris, France	2	3	3	3
Reykjavík, Iceland	3	6	4	5
Copenhagen, Denmark	4	9	7	6
Berlin, Germany	5	4	8	7



London leads the ranking in Europe and holds first place in the world classification. This year, there is a draw for first place between Paris, Reykjavík and Copenhagen, which occupy the second, third and fourth position, respectively. Berlin occupies the bottom position this time. As can be seen in the previous table, all of the cities in the regional **top 5** are in the top 10 in the overall ranking.

Likewise, it can be seen in the figure that most of the cities in Western Europe perform well in the overall ranking.

## Eastern Europe Top 5

City	Regional position	Global position 2017	Global position 2018	Global position 2019
Prague, Czech Republic	1	42	38	39
Wrocław, Poland	2	61	52	54
Tallinn, Estonia	3	55	57	55
Bratislava, Slovakia	4	71	63	62
Vilnius, Lithuania	5	89	69	65



The top-ranking Eastern European city is Prague. This city, as well as heading the region, is in the top 30 in terms of social cohesion, the environment and international projection. The regional ranking is completed with Wrocław, Tallinn, Bratislava and Vilnius.

## Top 3 Oceania

City	Regional position	Global position 2017	Global position 2018	Global position 2019
Sydney, Australia	1	17	18	17
Wellington, New Zealand	2	24	30	23
Auckland, New Zealand	3	36	36	35

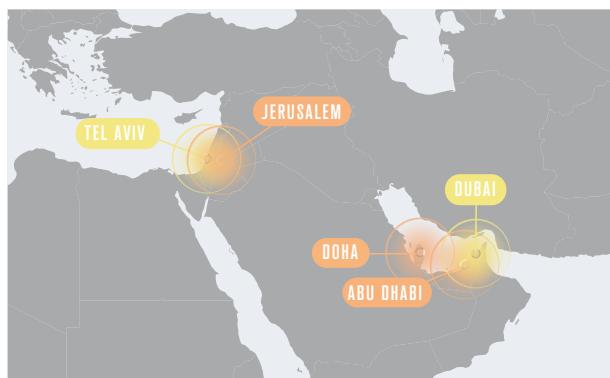


The Oceania ranking is led by Sydney, which stands out due to its fairly homogeneous performance in all dimensions, which result in it being in the top 30 in most of them. The second place in the regional ranking is held this year by the city of Wellington, which stands out for its good performance in the dimensions of environment (position 4), social cohesion (position 6) and governance (position 13).

The bottom position in the region is for Auckland, which performs well, especially in the environment, where it comes 16th.

## Middle East Top 5

City	Regional position	Global position 2017	Global position 2018	Global position 2019
Tel Aviv, Israel	1	76	74	70
Dubai, United Arab Emirates	2	102	93	92
Abu Dhabi, United Arab Emirates	3	128	125	117
Jerusalem, Israel	4	114	123	121
Doha, Qatar	5	127	126	125



Tel Aviv heads the Middle East classification and, in turn, is in position 70 at a global level. This city stands out for its good performance in the dimensions of the environment (34) and urban planning (38). It is followed by Dubai, which is noteworthy for occupying the fifth position in the technology ranking. Completing the top five cities of the region are Abu Dhabi, Jerusalem and Doha.



**"The current health crisis serves as a reminder that cities have a duty to people and, therefore, to human development. This crisis will change people's real needs; consequently, cities will have to change their urban policies and strategies."**

Joan Enric Ricart

## Noteworthy Cases



# Noteworthy Cases

There follows an individual analysis of a series of cities that occupy a prominent position, either in the overall ranking or in one or other of the dimensions.

The tables show the evolution of each city in the overall ranking, the dimensions in which it stands out, the position it occupies in its region and its overall classification.

The bar chart reflects the number of positions that the city would have to move up in each dimension in order to be the first. This analysis makes it possible to visualize both the strong and weak points of a city by identifying the dimensions in which work could be done to improve its performance.



## BARCELONA

Barcelona is the second-largest city in Spain and the second-best located in the ranking, in 26th position. It was the pioneer Spanish city in the implementation of receptive technologies in urban systems such as public transportation, parking, public lighting and waste management. It is one of the main cultural, economic and financial centers in Europe, as well as an important transportation and logistics center.

Barcelona is the leading Spanish city in terms of registered electric vehicles. A key factor in its success as a smart city is the great importance it places on research and knowledge and innovation, which results in it occupying fifth place in Europe and 18th in the world in scientific production.

The index highlights its performance, compared to other cities, in the dimensions of mobility and transportation, and urban planning.

<b>26</b>	<b>15</b>	<b>9</b>	<b>RA</b>
CIMI ranking	Regional CIMI	Mobility and transportation	Ranking according to performance

Evolution of the CIMI Over the Last Three Years

	2017	2018	2019
Position	25	25	26

## Positions the City of Barcelona Must Gain to Lead in Each Dimension





## BASEL

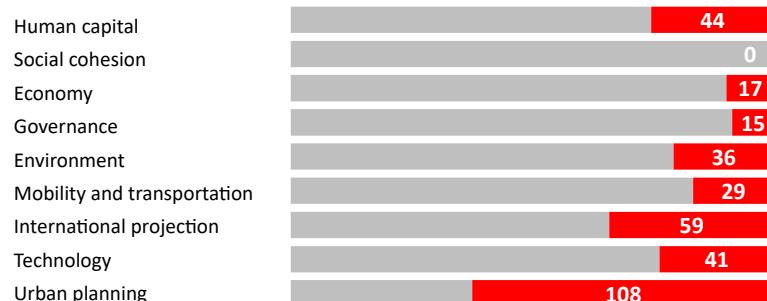
Basel is the second-best positioned Swiss city, occupying the 21st position in the overall ranking and the first in social cohesion. It possesses the Smart City Lab Basel space ([smartcitylabbasel.ch](http://smartcitylabbasel.ch)), designed for testing ideas, prototypes and services in the areas of logistics, mobility and others. This space brings together partners from industry, science, government and interested members of the general public, facilitating the exchange of skills and knowledge, encouraging innovation and promoting mutual learning, in order to develop new ideas and projects for the smart Switzerland of tomorrow. The motto of the city is “Creating Tomorrow Together.” The inclusion of all its sectors in the development of the city is one of the reasons that position it as a leader in social cohesion.

<b>21</b>	<b>11</b>	<b>1</b>	<b>RA</b>
<b>CIMI ranking</b>	<b>Regional CIMI</b>	<b>Social cohesion</b>	<b>Ranking according to performance</b>

### Evolution of the CIMI Over the Last Three Years

	2017	2018	2019
Position	30	24	21

### Positions the City of Basel Must Gain to Lead in Each Dimension





## BERN

The Swiss capital is ranked 31st in the overall ranking and first in governance. Although it is not the economic center of the country, it is its political center. The city is highly committed to sustainability in various areas: environmental sustainability, reflected in its energy and climate strategy for 2025; and social and digital sustainability, backed by the development of open source software. Bern is carrying out various projects, such as "City - Logistik Thun - Bern," aimed at improving the possibilities of mobility and transportation of goods with respect to nearby towns, since, among other things, there is a high level of mobility, and the project would help to improve access and facilitate transportation between them.

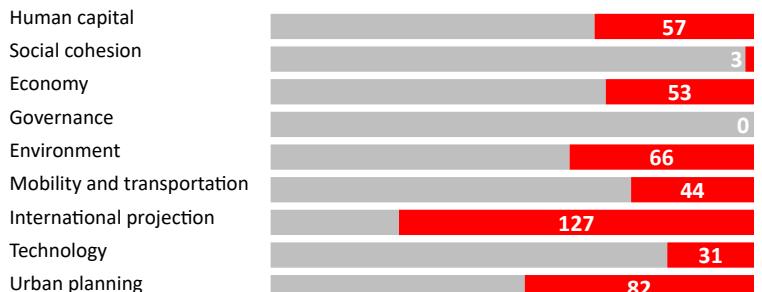
In addition to being ranked first in the governance dimension, it also performs very well in that of social cohesion.

31	17	1	RA
CIMI ranking	Regional CIMI	Governance	Ranking according to performance

Evolution of the CIMI Over the Last Three Years

	2017	2018	2019
Position	35	34	31

### Positions the City of Bern Must Gain to Lead in Each Dimension





## HONG KONG

The city of Hong Kong is an autonomous territory and one of the most influential cities in Southeast Asia. Its active and densely populated urban center is a major port and global financial center, with a landscape full of skyscrapers. The Hong Kong Smart City Blueprint project aims to turn this metropolis into a world-class smart city. It seeks to make use of innovation and technology (I&T) to address challenges in the urban sphere, city management and quality of life.

It also seeks to enhance Hong Kong's attractiveness for global companies and talent, prioritizing the city's sustainability, efficiency and safety.

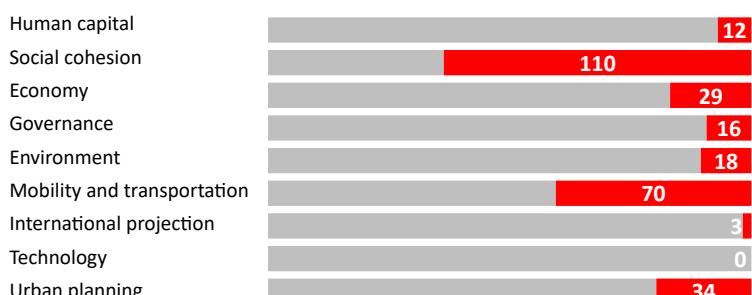
It ranks 10th in the overall ranking and is a model city in the technology dimension. It is also well positioned in the international projection dimension, where it takes fourth place.

10	3	RA
CIMI ranking	Regional CIMI	Ranking according to performance
Technology	International projection	Human capital
1	4	13

Evolution of the CIMI Over the Last Three Years

	2017	2018	2019
Position	27	14	10

### Positions the City of Hong Kong Must Gain to Lead in Each Dimension





## LONDON

London, the capital and most populous city of the United Kingdom is the largest urban area in the country. It houses more start-ups and programmers than almost any other city in the world. It launched the Smarter London Together project, which aims to be a flexible digital master plan to make the city the smartest in the world. This roadmap sets out how to collaborate with the municipalities and services of the capital, from transportation to healthcare services. Likewise, the project seeks to work more effectively with the technology community as well as with universities and other cities. It imagines the future of London as a “global test-bed city” for innovation, where the best ideas are developed with the highest standards of privacy and security and are spread from there to the whole world. The city has five missions: design, data exchange, connectivity, skills and collaboration.

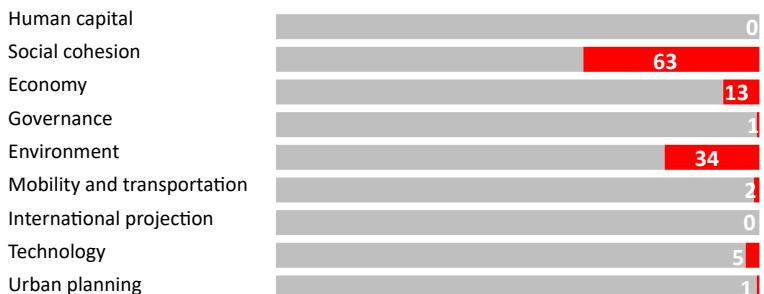
London is well placed in almost all the dimensions: it comes in first place for human capital and international projection, second place for governance and urban planning, and is in the top 10 for the dimensions of mobility and transportation and technology. Its worst performance can be seen in the dimension of social cohesion (position 64).

1	1	A
CIMI ranking	Regional CIMI	Ranking according to performance
1	1	2
International projection	Human capital	Urban planning

### Evolution of the CIMI Over the Last Three Years

	2017	2018	2019
Position	1	1	1

### Positions the City of London Must Gain to Lead in Each Dimension





## LOS ANGELES

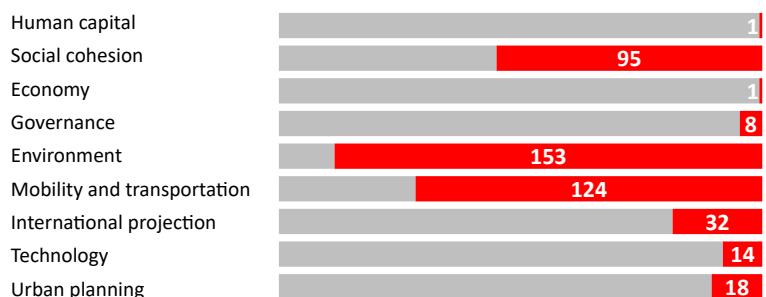
Los Angeles is promoting research and development in sustainability and data science, adopting technologies such as the Internet of Things (IoT) to improve the quality of life of its citizens. The metropolis faces challenges to urban functionality, such as traffic congestion, and environmental problems, such as pollution, climate change, and the threat of natural disasters such as earthquakes. To meet these challenges, Los Angeles has become one of the first cities to adopt smart city solutions and is a testing ground for urban technology. It is working with universities and technology companies to improve services and care for the environment, for example by facilitating recycling and waste disposal. Another goal is to increase its ability to attract businesses and innovation. In this sense, Los Angeles has been named the United States' Number One Digital City for the third consecutive year, according to the Center for Digital Government. This city is a leader in innovation and the use of data to improve the lives of its inhabitants, for example by making transportation more efficient and expanding green spaces.

16	4	RA
CIMI ranking	Regional CIMI	Ranking according to performance
Economy	Human capital	Governance
2	2	9

### Evolution of the CIMI Over the Last Three Years

	2017	2018	2019
Position	13	17	16

### Positions the City of Los Angeles Must Gain to Lead in Each Dimension





## MADRID

Madrid is the capital and the most populous city in Spain, as well as the first city in the country to appear in the overall ranking, where it holds position 25. It stands out in the dimensions of mobility and transportation (fifth place) and in international projection (11th).

It is committed to the development of a sustainable city. In January 2020 the city council presented an air quality plan called Madrid 360, which aims to provide the city with a total of 668 zero-emission buses and zero cost of consumption.

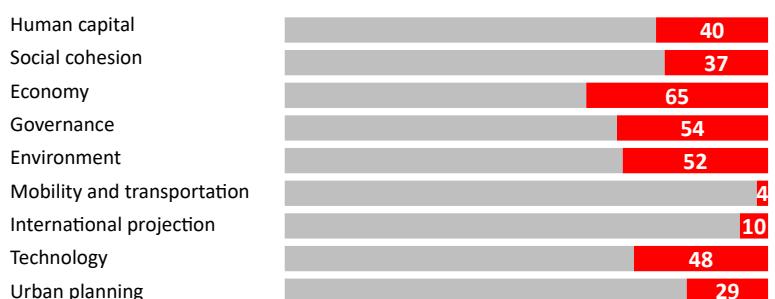
Another of the fronts that the plan will address is the limitation of the most-polluting vehicles in the entire city, a process already begun in January 2020. In addition, the municipal government has presented an aid line to help private individuals replace their current polluting vehicles with others using cleaner fuels. Another initiative to reduce the high level of pollution in the city is to pedestrianize the most central area, preventing access to all vehicles of non-residents.

CIMI ranking	14 Regional CIMI	5 Mobility and transportation	RA Ranking according to performance
25			

### Evolution of the CIMI Over the Last Three Years

	2017	2018	2019
Position	23	27	25

### Positions the City of Madrid Must Gain to Lead in Each Dimension





## NEW YORK

This year, New York City ranks second in the global ranking, behind London, but enjoys leadership in the dimensions of economy, mobility and transportation, and urban planning. The city is committed to a large number of initiatives in order to position itself as a leader in all dimensions. The One NYC 2050 strategy presents the work plan for achieving this goal by 2050. Among other things, the 80x50 project plans for an 80% reduction in greenhouse gases by then. Another objective is to attain zero waste in the city by 2030 (project OX30). In this sense, significant efforts are being made through reforms in the management of residential waste and incentives for companies to recycle all possible material and, in addition, to verify that this recyclable material is properly managed.

Social cohesion is the city's great unpaid debt. In this sense, it also has a work plan aimed at guaranteeing health coverage for all New Yorkers by 2050, regardless of their financial or immigration status.

<b>2</b>	<b>1</b>	<b>A</b>
<b>CIMI ranking</b>	<b>Regional CIMI</b>	<b>Ranking according to performance</b>
<b>1</b>	<b>1</b>	<b>1</b>
<b>Economy</b>	<b>Mobility and transportation</b>	<b>Urban planning</b>

### Evolution of the CIMI Over the Last Three Years

	2017	2018	2019
Position	2	2	2

### Positions the City of New York Must Gain to Lead in Each Dimension





## PARIS

The City of Light is characterized by open innovation, which gives its inhabitants and other actors control and access to the city's data flow. With the application of the internet of Things (IoT), it seeks to optimize the flow of people and vehicles in the city. In addition, it is working on the Paris Smart City 2050 architectural project, in which it is planned to construct buildings capable of generating renewable energy; bioclimatic and positive energy buildings to create the profile of a city symbolizing the fight against climate change.

Paris, together with London, is one of the most important financial hubs in Europe. It is one of the main tourist destinations worldwide, which is why it comes in second in the dimension of international projection. It comes in third in the overall ranking and also stands out in the dimensions of mobility and transportation (2) and human capital (6).

3	2	RA
CIMI ranking	Regional CIMI	Ranking according to performance
2	2	6
International projection	Mobility and transportation	Human capital

### Evolution of the CIMI Over the Last Three Years

	2017	2018	2019
Position	3	3	3

### Positions the City of Paris Must Gain to Lead in Each Dimension





## REYKJAVÍK

The most populous city in Iceland, in addition to being the country's capital—where half of its population lives—and the northernmost on the planet, is a city with 100% renewable hydroelectric and geothermal energy sources, leader in terms of energy sustainability and smart solutions. It possesses an efficient transportation system: a mobile application provides residents and tourists the possibility to find the most efficient route for their journey, and this has resulted in more intensive use of public transportation by residents.

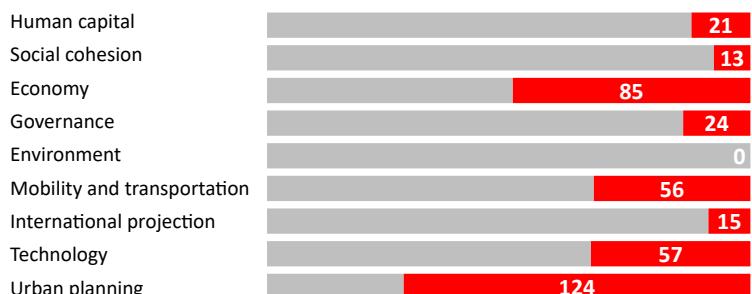
More than a decade ago, Reykjavík implemented a system of government interaction through which citizens can present ideas about any aspect of the city (from school opening hours to proposing new playgrounds); later, the city council analyzes the ideas and studies the possibility of developing them. This allows citizens to truly participate in specific changes to the city.

<b>5</b>	<b>3</b>	<b>1</b>	<b>RA</b>
CIMI ranking	Regional CIMI	Environment	Ranking according to performance

### Evolution of the CIMI Over the Last Three Years

	2017	2018	2019
Posición	6	4	5

### Positions the City of Reykjavík Must Gain to Lead in Each Dimension





## SANTIAGO

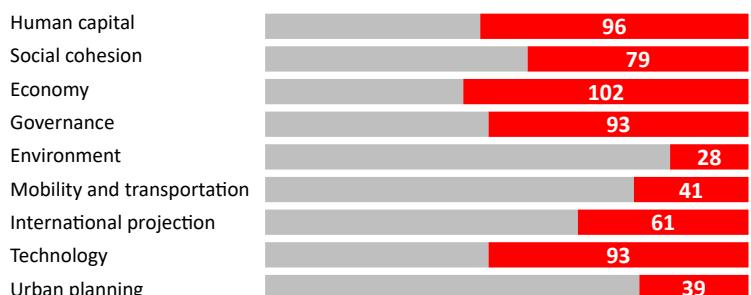
Santiago is ranked 68 in the overall ranking, stands out in the environment dimension and is the leader in its region. Together with Buenos Aires, it is the most innovative city in Latin America. The Chilean capital works to offer technological tools that favor territorial coordination so that its citizens, communities and companies can develop their projects. According to the Global Liveability Ranking 2019 (*The Economist*), Santiago ranks second as the most liveable city in Latin America.

<b>68</b>	<b>1</b>	<b>29</b>	<b>M</b>
CIMI ranking	Regional CIMI	Environment	Ranking according to performance

### Evolution of the CIMI Over the Last Three Years

	2017	2018	2019
Position	85	75	68

### Positions the City of Santiago Must Gain to Lead in Each Dimension





## SYDNEY

Sydney has developed a strategic smart city framework with the aim of guiding the city towards smart transformation. To do this, it provides a platform to improve the city's public places and the environment, foster its innovation ecosystem, celebrate its rich cultural diversity and strengthen the sense of community and belonging. The city seeks to put technology at the service of its citizens and residents. It is a dynamic, responsive metropolis that wishes to take advantage of technology and data for collaborative innovation for the creation of a prosperous and inclusive future for all its inhabitants.

It occupies 17th place in the overall ranking, the 7th place in the dimension of international projection and first place in its region.

<b>17</b>	<b>1</b>	<b>7</b>	<b>RA</b>
CIMI ranking	Regional CIMI	International projection	Ranking according to performance

### Evolution of the CIMI Over the Last Three Years

	2017	2018	2019
Position	17	18	17

### Positions the City of Sydney Must Gain to Lead in Each Dimension





## SINGAPORE

The city-state of Singapore is constantly showing its strength as the technological capital of Asia. It is a true smart city, where technological advances are the order of the day. It was the first in the world to launch a system of driverless taxis, and the government plans to launch similar buses by 2022. Those vehicles will become an inherent part of the streets and public transportation in certain urban areas.

Although its crime rates are already among the lowest in the world, the implementation of technologies in police performance creates more problems for criminals. In this sense, the city has implemented robot police and remote surveillance systems in order to guarantee the safety of its citizens.

It is ranked 9th in the overall ranking, second in technology and third in international projection.

9	2	RA
CIMI ranking	Regional CIMI	Ranking according to performance
Technology	International projection	Environment
2	3	7

### Evolution of the CIMI Over the Last Three Years

	2017	2018	2019
Position	8	6	9

### Positions the City of Singapore Must Gain to Lead in Each Dimension





## TOKYO

In Tokyo, a city with considerable technological influence on the global stage, the concept of a smart city has shifted strongly in recent years towards the social dimension. While the projects of other smart cities tend to focus on developing technological innovation to drive efficiency, in Japan they tend to focus more on driving social cohesion and addressing social issues such as the country's aging population. For this reason, a national initiative known as the Society 5.0 has been launched, with the goal of achieving a data-driven, human-centered, next-generation society that uses technology such as artificial intelligence and IoT. This vision would ensure that all inhabitants, regardless of their location, and including the elderly in rural areas, receive the benefits of innovation and technological advances.

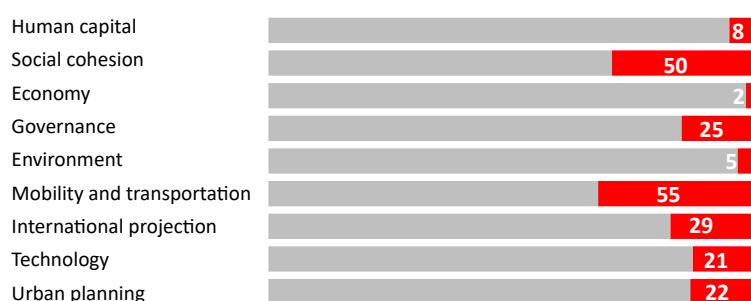
Tokyo is ranked 4th in the overall ranking and has a prominent position in the economy, where it comes 3rd. It is also the leader of its region.

CIMI ranking	Regional CIMI	RA
3	6	9
Economy	Environment	Human capital

### Evolution of the CIMI Over the Last Three Years

	2017	2018	2019
Position	5	5	4

### Positions the City of Tokyo Must Gain to Lead in Each Dimension





## Cities in Motion. Evolution

A city's transformation is vitally important in understanding the focus of its development target. Thus, **Table 13** sets out the evolution of the index during the past three years with respect to the top 50 cities in the **2019 CIMI** ranking.

The results reveal a high degree of stability, especially in the top positions of the ranking, without any very abrupt positive or negative changes. There are two cities which present a particularly positive evolution in 2017-2019. This is the case of Hong Kong, which has climbed seventeen positions thanks to its better performance in mobility and transportation and international projection; and Vancouver, which has climbed eighteen positions thanks to its better performance in the economy and the environment.

Within the group of cities that have had a negative evolution in the period 2017 to 2019, Melbourne, Göteborg and Düsseldorf stand out, falling sixteen, twelve and nine positions, respectively. In the case of the first of these, its fall is due, above all, to the dimension of international projection, while the other two have deteriorating results in human capital and governance.

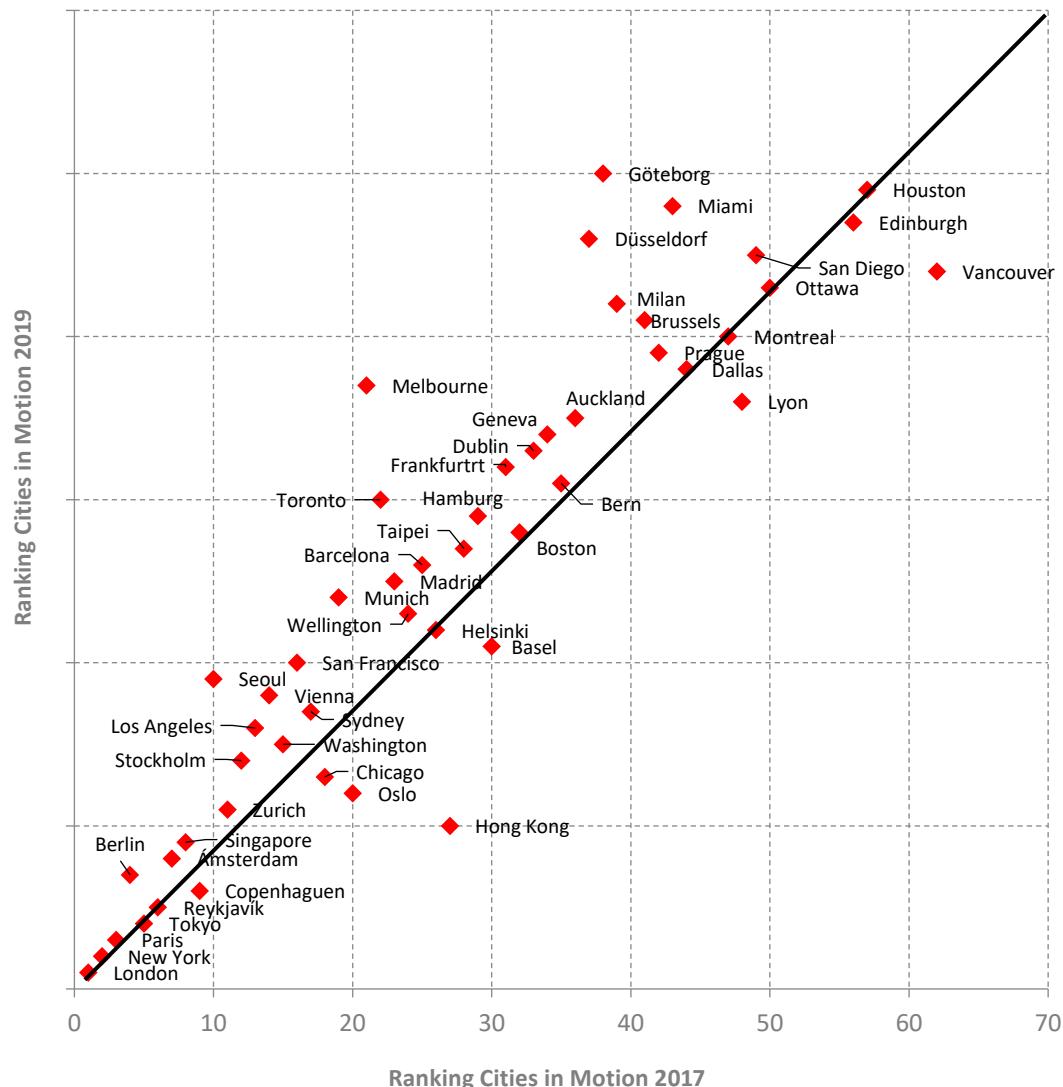
**Table 13. Evolution of the Index for the Top 50 Cities in the 2019 Ranking  
(Over the Last Three Years)**

City	2017	2018	2019	2017- 2018	2018- 2019
London - United Kingdom	1	1	1	↗ 0	↗ 0
New York - USA	2	2	2	↗ 0	↗ 0
Paris - France	3	3	3	↗ 0	↗ 0
Tokyo - Japan	5	5	4	↘ 0	↑ 1
Reykjavik - Iceland	6	4	5	↑ 2	↓ -1
Copenhagen - Denmark	9	7	6	↑ 2	↑ 1
Berlin - Germany	4	8	7	↓ -4	↑ 1
Amsterdam - Netherlands	7	9	8	↓ -2	↑ 1
Singapore - Singapore	8	6	9	↑ 2	↓ -3
Hong Kong - China	27	14	10	↑ 13	↑ 4
Zurich - Switzerland	11	10	11	↑ 1	↓ -1
Oslo - Norway	20	16	12	↑ 4	↑ 4
Chicago - USA	18	13	13	↑ 5	↗ 0
Stockholm - Sweden	12	12	14	↗ 0	↓ -2
Washington - USA	15	20	15	↓ -5	↑ 5
Los Angeles - USA	13	17	16	↓ -4	↑ 1
Sydney - Australia	17	18	17	↓ -1	↑ 1
Vienna - Austria	14	11	18	↑ 3	↓ -7
Seoul - South Korea	10	15	19	↓ -5	↓ -4
San Francisco - USA	16	19	20	↓ -3	↓ -1
Basel - Switzerland	30	24	21	↑ 6	↑ 3
Helsinki - Finland	26	23	22	↑ 3	↑ 1
Wellington - New Zealand	24	30	23	↓ -6	↑ 7
Munich - Germany	19	21	24	↓ -2	↓ -3
Madrid - Spain	23	27	25	↓ -4	↑ 2
Barcelona - Spain	25	25	26	↗ 0	↓ -1
Taipei - Taiwan	28	26	27	↑ 2	↓ -1
Boston - USA	32	28	28	↑ 4	↗ 0
Hamburg - Germany	29	31	29	↓ -2	↑ 2
Toronto - Canada	22	33	30	↓ -11	↑ 3
Bern - Switzerland	35	34	31	↑ 1	↑ 3
Frankfurt - Germany	31	29	32	↑ 2	↓ -3
Dublin - Ireland	33	32	33	↑ 1	↓ -1
Geneva - Switzerland	34	35	34	↓ -1	↑ 1
Auckland - New Zealand	36	36	35	↗ 0	↑ 1
Lyon - France	48	46	36	↑ 2	↑ 10
Melbourne - Australia	21	22	37	↓ -1	↓ -15
Dallas - USA	44	40	38	↑ 4	↑ 2
Prague - Czech Republic	42	38	39	↑ 4	↓ -1
Montreal - Canada	47	41	40	↑ 6	↑ 1
Brussels - Belgium	41	37	41	↑ 4	↓ -4
Milan - Italy	39	44	42	↓ -5	↑ 2
Ottawa - Canada	50	47	43	↑ 3	↑ 4
Vancouver - Canada	62	60	44	↑ 2	↑ 16
San Diego - USA	49	42	45	↑ 7	↓ -3
Düsseldorf - Germany	37	45	46	↓ -8	↓ -1
Edinburgh - United Kingdom	56	56	47	↗ 0	↑ 9
Miami - USA	43	43	48	↗ 0	↓ -5
Houston - USA	57	59	49	↓ -2	↑ 10
Göteborg - Sweden	38	39	50	↓ -1	↓ -11

**Figure 5** below shows the positions that the top fifty cities in the ranking occupied in 2017 and 2019. Those cities that show a positive evolution are below the 45-degree angle formed by the diagonal, while those that did not are above the line. Here you can see graphically that which was observed in **Table 13**: the cities that suffered a

sharp drop during this period and are above the diagonal line are Melbourne, Düsseldorf and Göteborg; those that evolved in a particularly positive way over the same period are Hong Kong and Vancouver.

**Figure 5. Top 50 Cities in the 2019 Ranking (Over the Last Three Years)**



# Cities in Motion Compared With Other Indexes

In this section, we conduct a comparative study of the **CIMI** and other indexes. **Table 14** shows the top 10 cities in this ranking (2019) and those in six other indexes that have been considered. Those that also appear in the **CIMI** are shown shaded.

While the classifications being studied vary in terms of methodology and indicators, they all agree that a city is more powerful, prosperous and competitive if it manages to thrive in its various dimensions; from its economy and finances to its cultural importance—which could be measured by how it promotes music and fashion—to the ease with which it ensures the creation of new businesses and the quality of life and use of high technology it offers. In this respect, it may be noted that, with the exception of Reykjavík, all of the cities in the **CIMI** frequently appear in some of the other indexes under consideration.

The city-state of Singapore, which occupies position 7 in the **CIMI**, is in the top 10 of four of the six other rankings being considered. It also stands out for its high performance in the dimensions of international projection, environment, governance and economy. As for technology,

as previously mentioned, the city shows a very good performance, coming second in that dimension.

Other cities, such as New York, London, Paris, Tokyo and Hong Kong frequently appear in the top 10 most prosperous cities or which have the highest quality of life in the world.

As can be seen, all the cities in our **top 10**, with the exception of Reykjavík, appear in the top positions of the indexes under consideration. The Icelandic capital is often excluded from many rankings due to the size of its population; however, despite being so small, it has continued to demonstrate its skills and strengths over the years and has managed to stand out among the best cities. Unlike many of the indexes with which it is compared, the **CIMI** takes into account a broader geographical coverage, as well as considering a total of 174 cities.

Finally, as in other years, it can be seen that the first two positions of The Global Cities Index, the Global Financial Centers Index (Z/Yen) and the Global Power City Index (MMF) are occupied by the same cities that occupy the first two positions of the **CIMI**, but in reverse order.

**Table 14. Comparison with Other Indexes (Top 10)**

Ranking by city	CIMI 2019 (IESE)	Global Cities Index 2019 (A.T. Kearny)	Global Financial Centres Index 2019, GFCI (Z/Yen)	Financial Index 2019 (Z/YEN)	Global Power City Index 2019 (MMF)	Quality of Living City Ranking 2019 (Mercer)	Global Liveability Ranking 2019 (The Economist)
1	London	New York	New York	Beijing	London	Vienna	Vienna
2	New York	London	London	Shanghai	New York	Zurich	Melbourne
3	Paris	Paris	Hong Kong	New York	Tokyo	Vancouver	Sydney
4	Tokyo	Tokyo	Singapore	Guangzhou	Paris	Munich	Osaka
5	Reykjavík	Hong Kong	Shanghai	Shenzhen	Singapore	Auckland	Calgary
6	Copenhagen	Singapore	Tokyo	London	Ámsterdam	Düsseldorf	Vancouver
7	Berlin	Los Angeles	Beijing	Hong Kong	Seoul	Frankfurt	Toronto
8	Amsterdam	Chicago	Dubai	Singapore	Berlin	Copenhagen	Tokyo
9	Singapore	Beijing	Shenzhen	San Francisco	Hong Kong	Geneva	Copenhagen
10	Hong Kong	Washington	Sydney	Chicago	Sydney	Basel	Adelaide

# Cities in Motion: Ranking of Cities by Population

Next, the ranking of cities according to their population is presented, for which a classification of the 174 cities of the index has been carried out taking into account this value. The cities were grouped according to various sources such as *The Economist* and the United Nations. **Table 15** shows the various categories and the number of the **CIMI** cities included in each.

**Table 15. Classification of Cities by Population**

Category	Number of cities	
Fewer than 600,000	Smallest cities	12
Between 600,000 and 1 million	Small cities	13
Between 1 million and 5 million	Medium-sized cities	93
Between 5 million and 10 million	Large cities	26
More than 10 million	Megacities	30

## RANKING OF THE SMALLEST CITIES

The top five smallest cities are headed by Reykjavík, which comes fifth in the overall ranking and third in the Western Europe region. Its performance is far superior to that of other cities of similar size in the overall ranking, which are located more than 15 places further down. In second place in this ranking is Basel and closing out the **top 5** are three Swiss cities: Wellington, Bern and Geneva. These three are distinguished by their good performance in the dimensions of governance and social cohesion.

### Top Five Cities With Fewer Than 600,000 Inhabitants

City	Position by size	Overall position 2017	Global position 2018	Global position 2019
Reykjavík, Iceland	1	6	4	5
Basel, Switzerland	2	30	24	21
Wellington, New Zealand	3	24	30	23
Bern, Switzerland	4	35	34	31
Geneva, Switzerland	5	34	35	34

## RANKING OF SMALL CITIES

The following table shows the **top 5** of the small cities: those with a population of 600,000 to 1 million inhabitants. This ranking is led by Edinburgh, followed by Bratislava, Vilnius and Eindhoven. Completing the ranking is Palma de Mallorca. The first four stand out for their performance in social cohesion and human capital, and the fifth does so for its position in international projection.

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### Top Five Cities With Between 600,000 and 1 Million Inhabitants

City	Position by size	Overall position 2017	Global position 2018	Global position 2019
Edinburgh, United Kingdom	1	56	56	47
Bratislava, Slovakia	2	71	63	62
Vilnius, Lithuania	3	89	69	65
Eindhoven, Netherlands	4	72	76	77
Palma de Mallorca, Spain	5	79	77	78

## RANKING OF MEDIUM-SIZED CITIES

Below are the **top five** medium-sized cities—that is, those with between 1 million and 5 million inhabitants. This classification is led by Copenhagen, followed by Amsterdam, Zurich, Oslo and Stockholm, which make up the **top 20** of the overall ranking and stand out in almost all dimensions.

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### Top Five Cities With Between 1 Million and 5 Million Inhabitants

City	Position by size	Overall position 2017	Global position 2018	Global position 2019
Copenhagen, Denmark	1	9	7	6
Amsterdam, Netherlands	2	7	9	8
Zurich, Switzerland	3	11	10	11
Oslo, Norway	4	20	16	12
Stockholm, Sweden	5	12	12	14

## RANKING OF LARGE CITIES

Below is the ranking of the large cities: those with between 5 million and 10 million inhabitants. This ranking is led by Berlin, followed by Singapore and Hong Kong, while Chicago and Washington occupy the bottom positions in this ranking.

### Top Five Cities With Between 5 Million and 10 Million Inhabitants

City	Position by size	Overall position 2017	Global position 2018	Global position 2019
Berlin, Germany	1	4	8	7
Singapore, Singapore	2	8	6	9
Hong Kong, China	3	27	14	10
Chicago, United States	4	18	13	13
Washington, United States	5	15	20	15

## RANKING OF MEGACITIES

The megacities ranking includes those cities with a population of more than 10 million. This ranking is led by London, followed by New York, Paris, Tokyo and Los Angeles, which are all in the **top 20** overall and stand out in most dimensions, except for social cohesion.

### Top Five Cities With More Than 10 Million Inhabitants

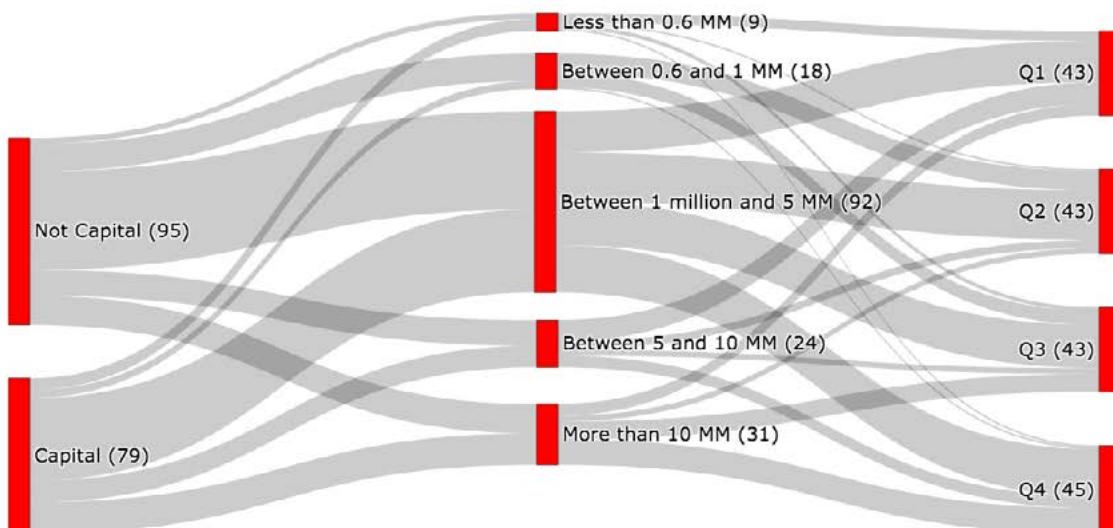
City	Position by size	Overall position 2017	Global position 2018	Global position 2019
London, United Kingdom	1	1	1	1
New York City, United States	2	2	2	2
Paris, France	3	3	3	3
Tokyo, Japan	4	5	5	4
Los Angeles, United States	5	13	17	16

**Figure 6**, below, shows the distribution of cities, according to whether they are national capitals or not (left), based on the size of their population (center) and the position in the ranking (right). This figure maintains the grouping by position used in **Figure 5** and incorporates the grouping by population size defined in this section.

It shows the high proportion of medium-sized cities in the ranking. They are distributed approximately equally, both in the group of capital cities and the group of those that are not.

Regarding the performance of the cities, in group Q1 (those that occupy positions 1 to 43 of the ranking), there is a high proportion of those classified as medium-sized cities, but there is also a significant number of those classified as large cities occupying top positions. Likewise, a notable proportion of the *smallest cities* occupy top positions in the ranking. Such is the case of Reykjavík, Basel, Wellington, Bern and Geneva (the top five smallest cities in the ranking), which are all included in group Q1 of the ranking.

**Figure 6**



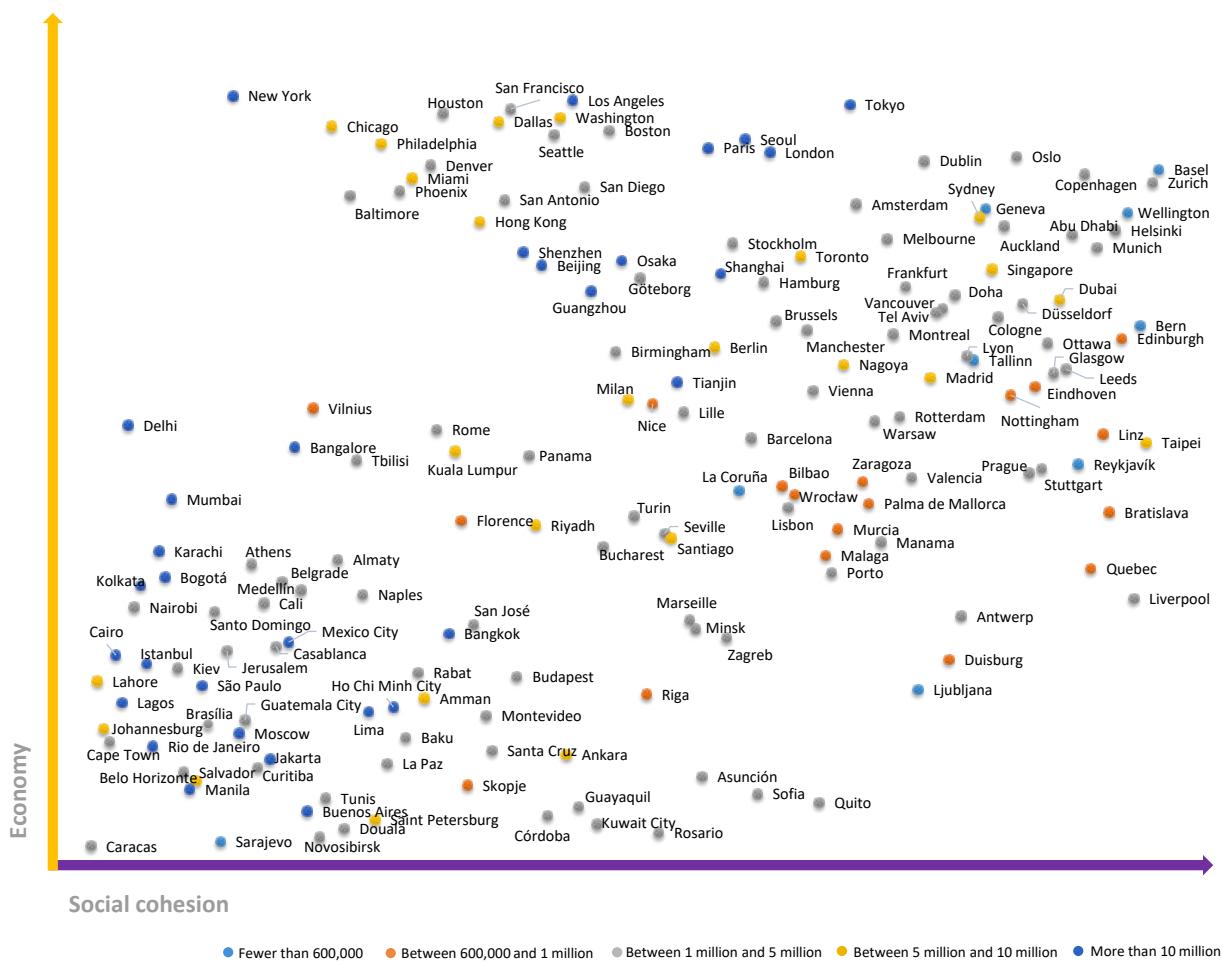
# Cities in Motion: Analysis of Dimensions in Pairs

In this section, the position of cities with respect to two dimensions is analyzed simultaneously with the aim of observing whether there is any relationship between the two. Furthermore, cities are analyzed by population, according to the categories analyzed in the previous section.

**Figure 7** shows the dimensions of the economy on the y-axis and social cohesion on the x-axis. As can be seen, the cities with fewer than 600,000 inhabitants (the smallest cities) show a high degree of social cohesion and are located on the right side of the figure. In this position can be found cities such as Quebec, Reykjavík and Bratislava. In contrast, those classified as megacities are located on

the left side of the figure, indicating a low performance in this dimension. Here can be found New York City, Chicago and Hong Kong, among others. The top section of the figure shows the cities that have demonstrated good economic performance such as Tokyo, New York, Los Angeles, San Francisco, London and Paris. At the other end of the figure, in the lower area, are those that occupy the bottom positions in the ranking in the economy dimension, such as Quito, Kuwait City and Rosario. Meanwhile, Caracas, in the lower left corner, stands out for occupying the tail of both rankings.

**Figure 7. Economy and Social Cohesion Dimensions**

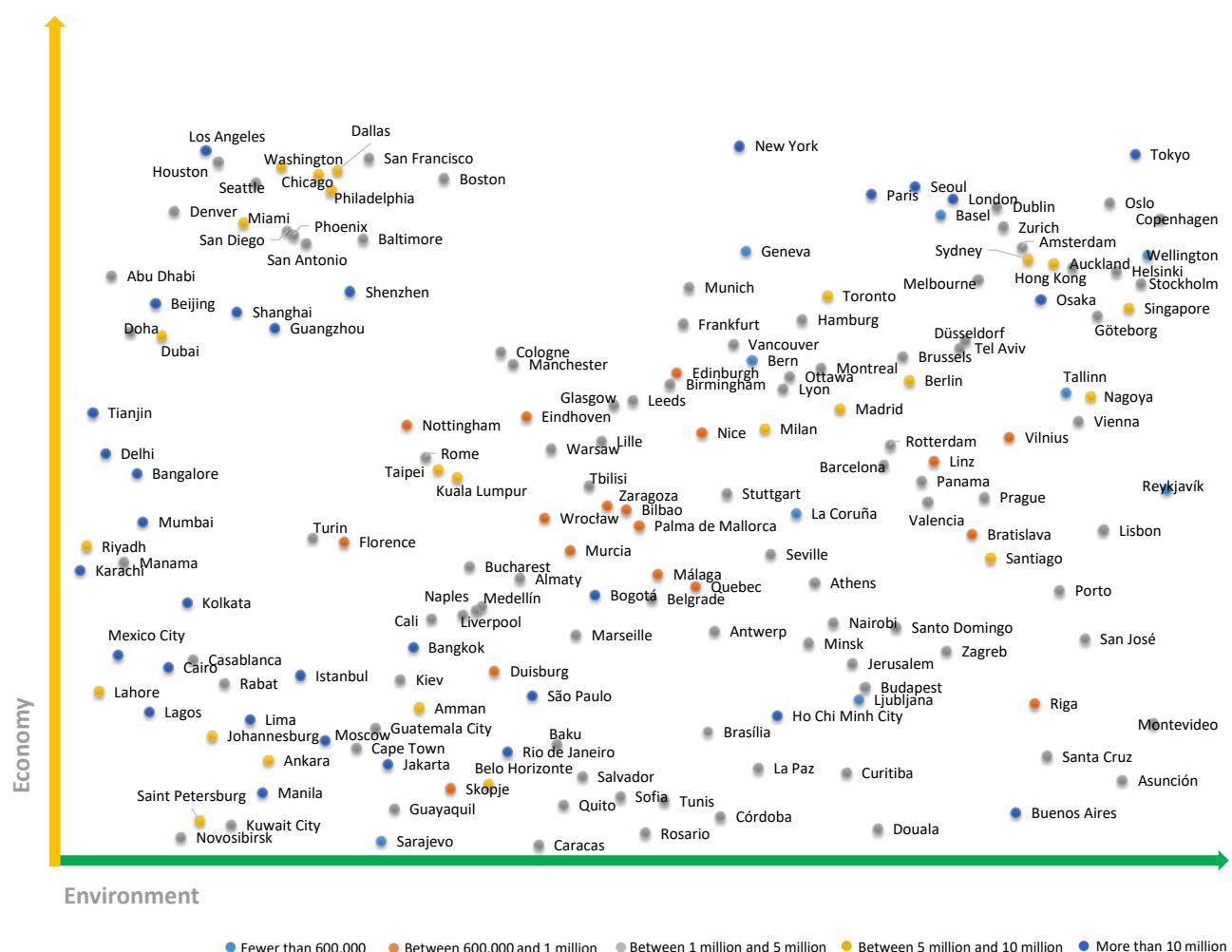


**Figure 8** analyzes the dimensions of the economy and the environment. The first of these is shown on the y-axis and the second on the x-axis.

In the upper left area of the figure, there are several Asian and American cities which stand out for having a good performance in the economy dimension but a poor one in the environment. One might suppose that a high degree of economic development is detrimental to the well-being of the environment unless cities take ecological criteria into account during that development. In the lower left corner are cities with a low performance level in both these dimensions, such as Lagos, Johannesburg, Ankara and Manila. The lower right side shows the cities with low economic development but a good performance in the environment. In this group we find several Latin American cities, including Buenos Aires, Asunción,

Montevideo and Santa Cruz. In this case, one might think that cities with less economic development are better at caring for the environment. Finally, the upper right area includes cities with good performance in both dimensions. This group includes a large number of European cities, such as Stockholm, Copenhagen, Amsterdam, London, Oslo and Zurich, as well as Asian cities such as Hong Kong and Seoul, and cities from Oceania such as Sydney and Wellington. These cities demonstrate that it is possible to break the tension between the economy and the environment.

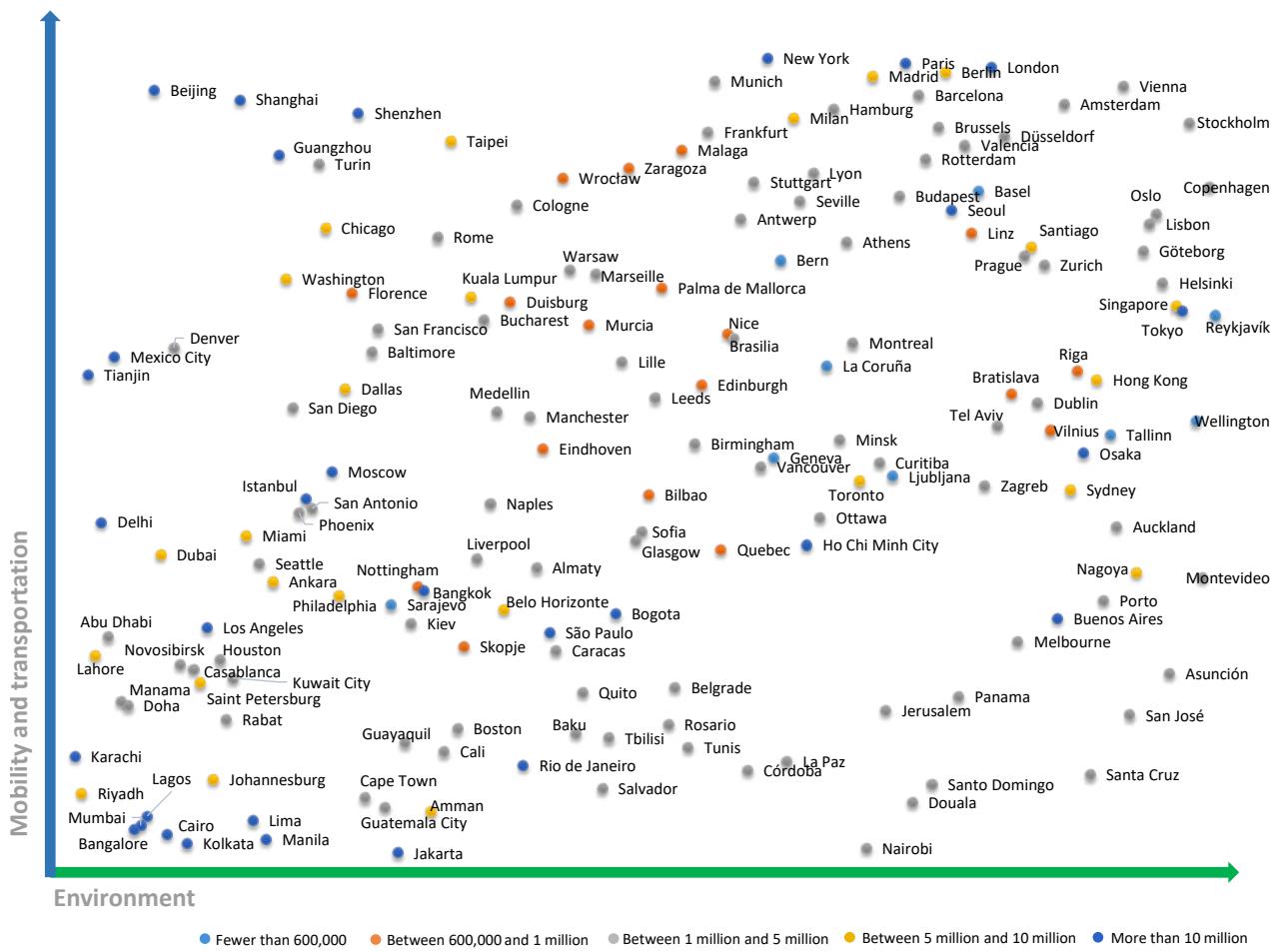
**Figure 8. Economy and Environment Dimensions**



**Figure 9** shows the dimension of mobility and transportation on the y-axis and that of the environment on the x-axis. The upper left area shows cities with good performance in the first of the aforementioned dimensions, but poor performance in the second. This is the case of some Asian cities, including Beijing, Shanghai, Shenzhen and Taipei, and some US cities, such as Chicago, Washington and Denver. In the upper right area are those that have good management in both dimensions, Swiss and Scandinavian cities; this is the case of Stockholm, Oslo, Vienna and Basel. For their part, Madrid and Barcelona also show a good performance in both dimensions, along with

other European cities such as Paris, London and Berlin. In the lower-left area are those cities that have a low level of development in mobility and transportation, as well as in the environment, the main examples being Lima, Manila, Cairo and Bangalore. Finally, the lower-right side shows the group of cities with a high degree of environmental development but a low level of mobility and transportation, made up of cities belonging to Central and South America, such as Asunción, San José, Santa Cruz, Panama and Santo Domingo.

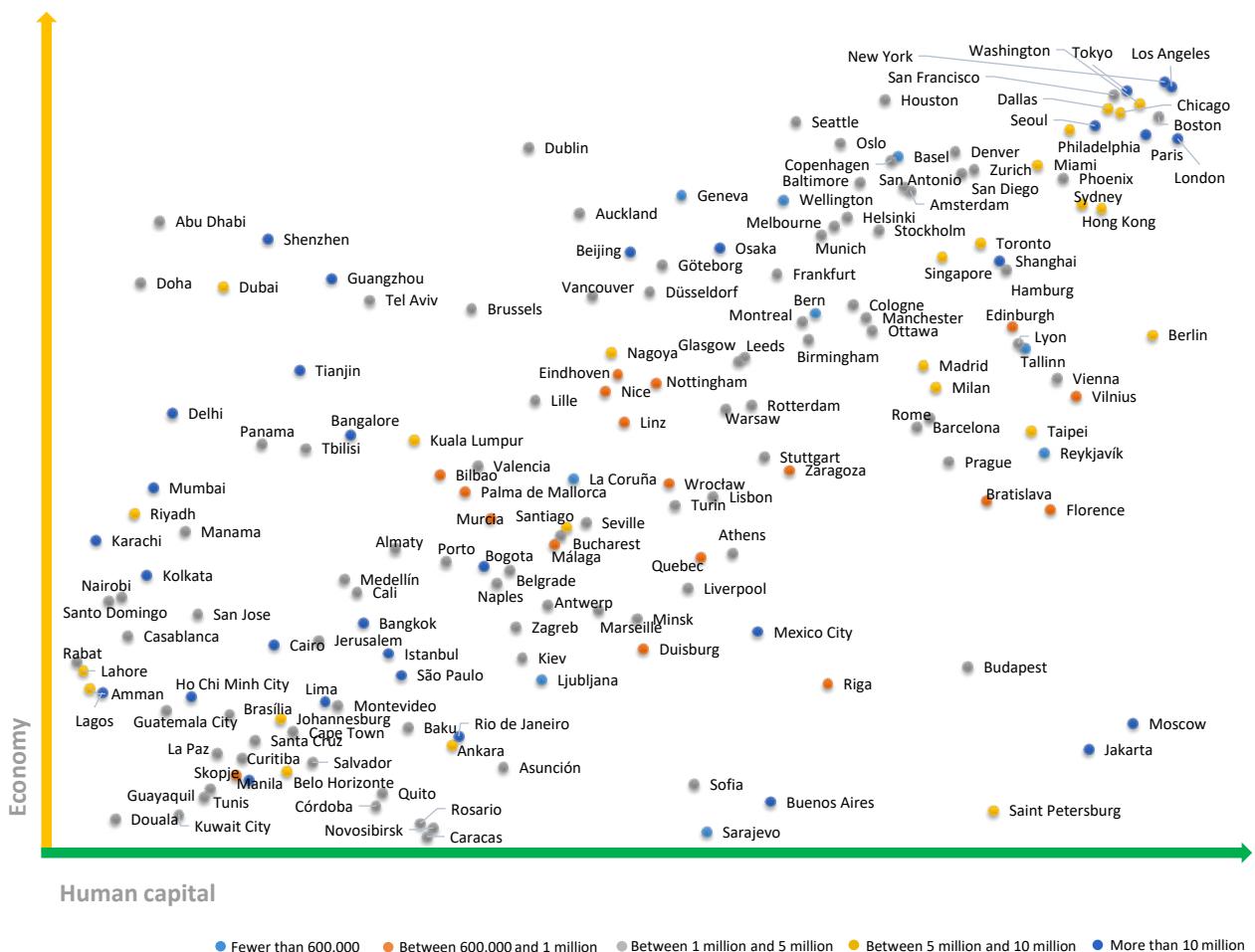
### Figure 9. Mobility and Transportation and Environment Dimensions



**Figure 10** reflects the relationship between the economy and human capital dimensions. As can be seen, those cities with a good position in the economy also do well in human capital and are located in the upper right part of the figure. There are American cities such as Boston, New York, Chicago and San Francisco; European ones such as London and Paris; and Asian and Australian ones such as Tokyo, Hong Kong, Seoul and Sydney. All of them are in that area, indicating good performance in both dimensions. On the other hand, there is a large number of cities with poor performance in both dimensions, such as is

the case of Douala, Kuwait City and Guayaquil. In other words, in general terms, cities that perform poorly in the economy are unlikely to achieve good performance in human capital and vice versa, albeit with exceptions, such as Jakarta, Buenos Aires, Moscow and Saint Petersburg, which occupy a relatively good position in the environment but a poor one in the economy. By contrast, Abu Dhabi, Shenzen or Doha perform relatively well in the economy but are somewhat deficient in human capital.

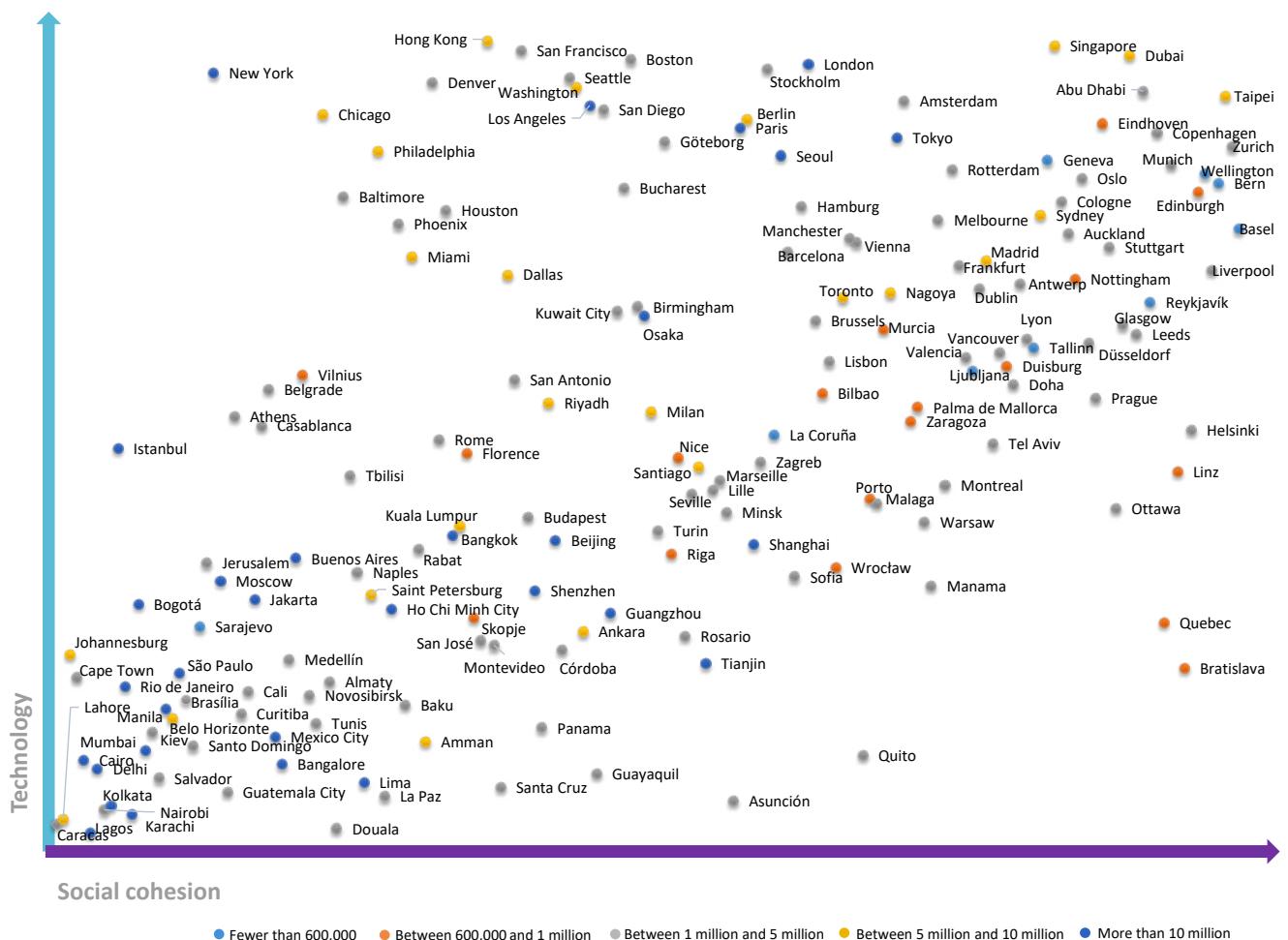
**Figure 10. Economy and Human Capital Dimensions**



**Figure 11** reflects the relationship between the technology and social cohesion dimensions. It may be observed that, in general terms, the most populated cities achieve good performance in technology at the cost of poor performance in social cohesion. Such is the case of certain American cities such as New York, Los Angeles and Philadelphia. In the opposite area of the figure, we have less populated cities, which achieve good performance in both dimensions (upper right area). In this group we find Copenhagen, Abu Dhabi, Dubai, Singapore and Taipei. On

the other hand, smaller cities (with fewer than 1 million inhabitants) show a relatively good performance in social cohesion. Such is the case of Eindhoven, Basel, Bern and Wellington. Finally, in the lower left quadrant we find cities that have a poor performance in both dimensions; these are cities that belong to emerging countries, such as Guatemala, San Salvador, New Delhi and Caracas.

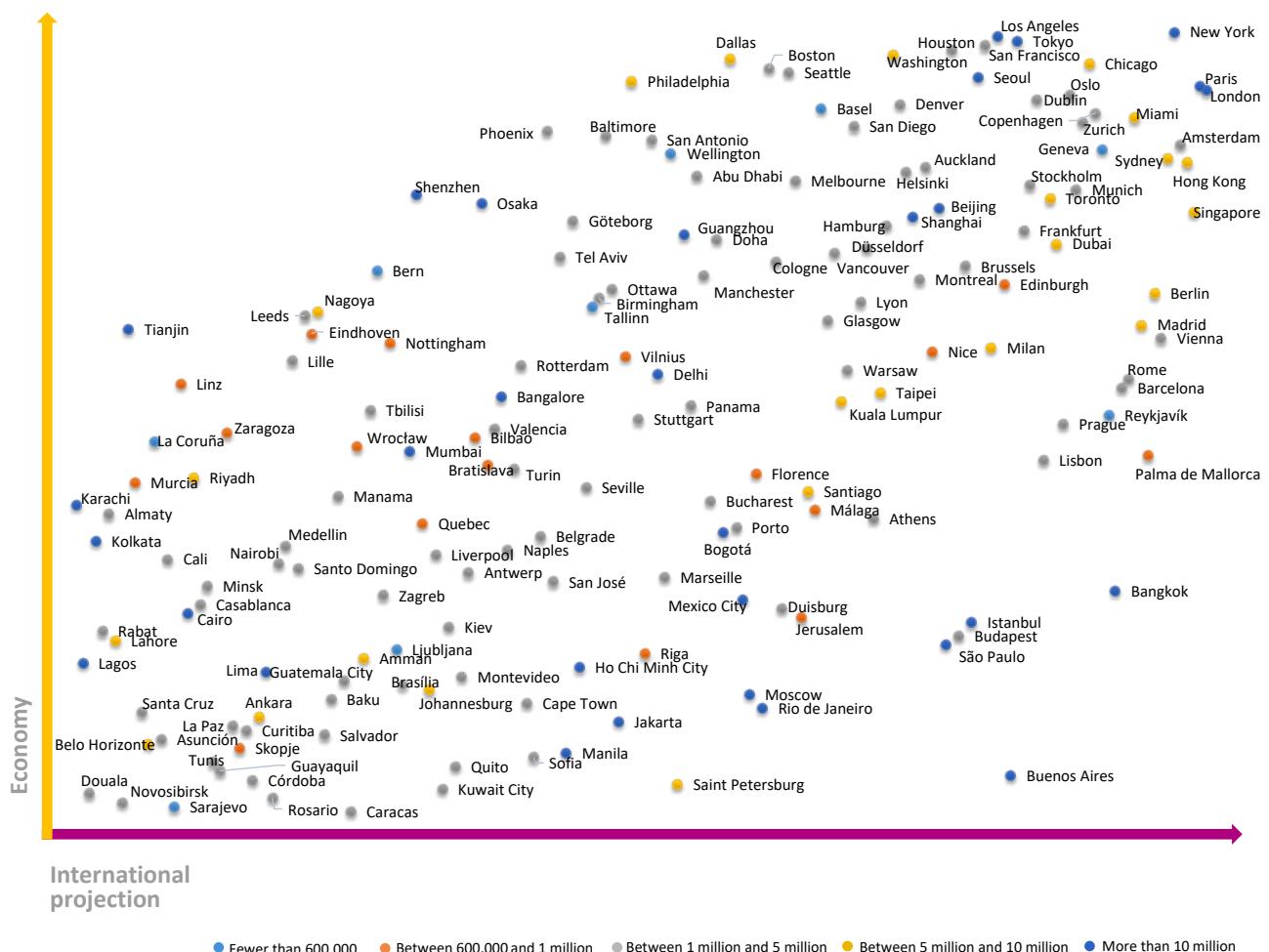
**Figure 11. Technology and Social Cohesion Dimensions**



**Figure 12** reflects the relationship between the dimensions of the economy and international projection. A pattern can be seen here: cities perform either well in both dimensions or, conversely, poorly in both. This allows us to discern the relationship between certain dimensions, where, in this case, a good performance in the economy could translate into good international projection or, on the contrary, a poor performance in the economy manifests itself in less international projection. So, it is not strange to find that, of the cities considered in the index, there are none with a good performance in the economy and a poor one in international projection.

In the opposite case, we find only a few exceptions, such as Buenos Aires and Bangkok, that do not achieve good positions in the economy but do however perform well in international projection. Among those cities that perform well in both dimensions are the US cities of New York, Los Angeles, Chicago and San Francisco; the European ones of Paris, London, Copenhagen and Amsterdam; and the Asian ones of Tokyo, Seoul, Singapore and Hong Kong. Among those that perform poorly in both dimensions we find Tunis, Douala, Sarajevo and Córdoba.

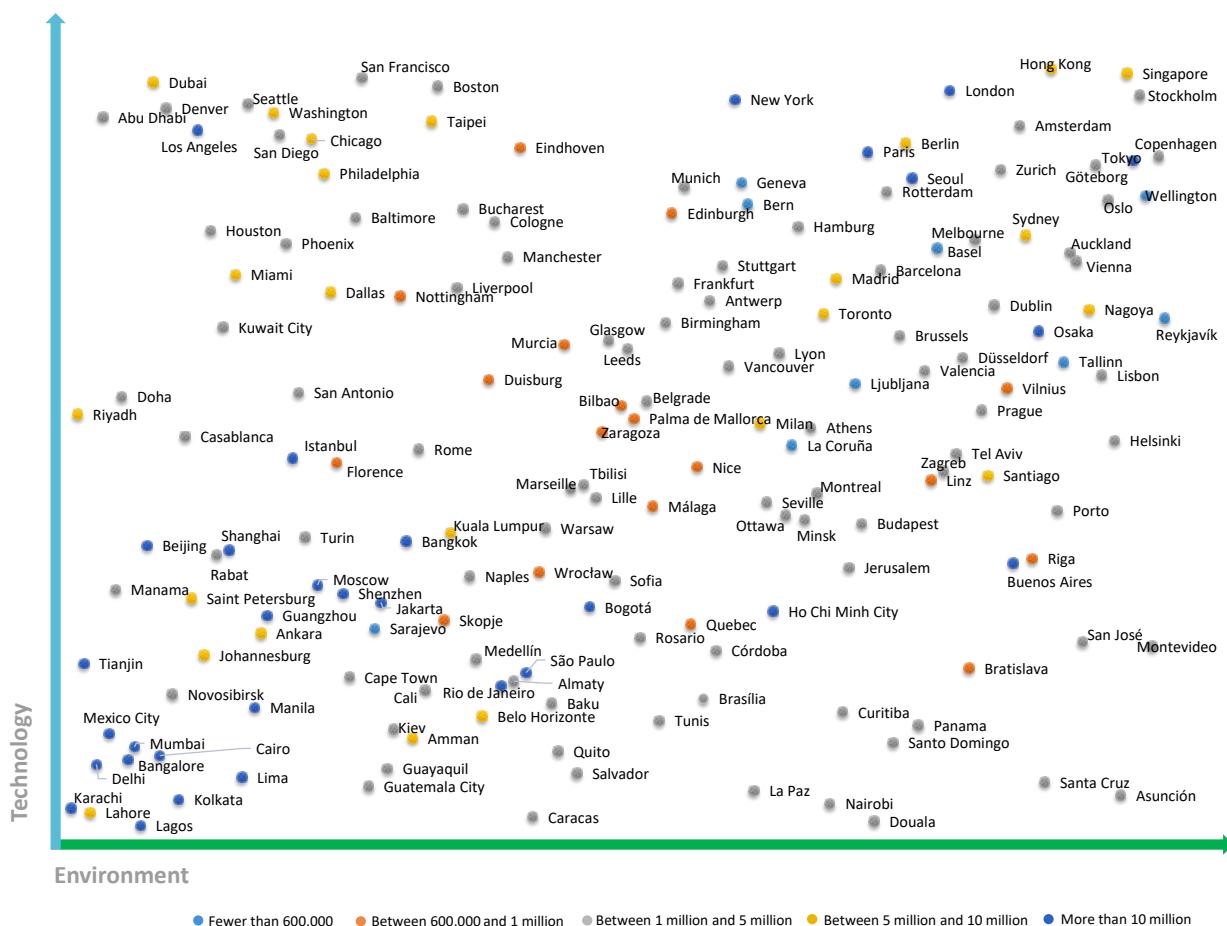
**Figure 12. Economy and International Projection Dimensions**



**Figure 13** describes the relationship between the technology and environment dimensions. Here we can see four groups, divided into the respective four quadrants. In the top left quadrant are cities characterized by a good performance in technology but not in the environment. Among them are US cities such as Denver, San Francisco, Washington and Los Angeles; and Middle East ones such as Dubai. Cities with poor performance in both dimensions are located in the lower left quadrant; this is the case of Lahore, Lago, Karachi and Calcutta. In the upper

right quadrant are cities with good performance in both dimensions. There are Europeans ones such as London, Copenhagen and Stockholm; Asians ones such as Singapore, Hong Kong and Tokyo; and ones from Oceania, such as Auckland and Melbourne. Finally, in the group of cities performing poorly in technology but well in the environment we find Latin American cities such as Santa Cruz, Asunción, Panama City, San José and Santo Domingo; and Eastern European cities such as Riga and Bratislava.

**Figure 13. Technology and Environment Dimensions**



# Cities in Motion: A Dynamic Analysis

In order to assess the growth trends and potential of the different cities, we have created a figure that seeks to capture these aspects. Therefore, **Figure 14** sets out the current position of each of the cities in the **CIMI** index (x-axis) and the trend (y-axis). As a measure for calculating the second value, the change in position experienced between 2017 and 2019 by the cities in this study's ranking has been used. This means that the cities in the top part of the figure are those that have improved their position while those in the bottom part of the figure have dropped. Consequently, in the center are those that have not undergone any significant changes in their position over the years analyzed.

The figure's area has been divided into four quadrants according to the type of city (consolidated, challenger, potential, and vulnerable).

The first group, that of consolidated cities (bottom right quadrant), includes those cities that, although they have a middle to high overall position, have not experienced any changes throughout the period or have lost a few positions. It is made up of cities from different geographical regions. Among those who have lost positions in the ranking we find Melbourne, Stuttgart,

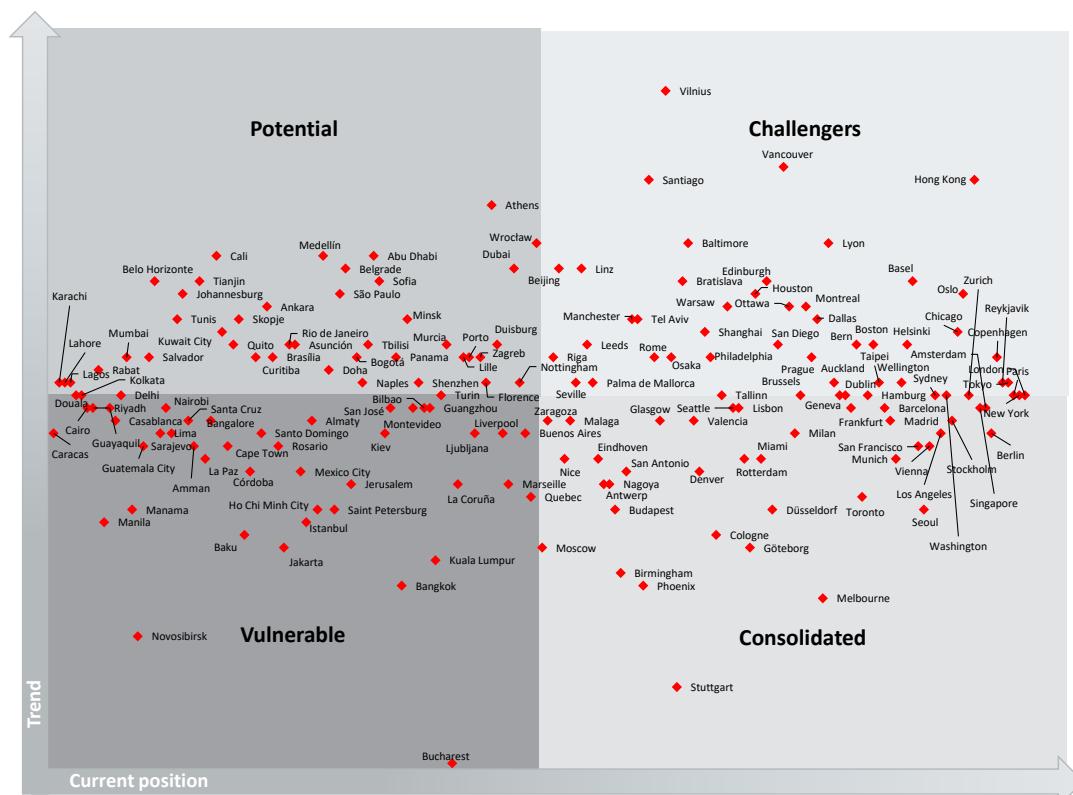
Göteborg and Phoenix. Those that are in the right central area of the figure are those which occupy good positions in the ranking and whose position remains fairly constant. This is the case, for example, of London, Paris, Amsterdam and Reykjavík (Europe); Tokyo and Singapore (Asia); and New York, San Francisco, Boston and Washington (North America).

The second group, that of challenger cities (top right quadrant), is made up of those that have improved their positions in the index at a fast rate and are already in the middle-to-high area of the classification. Some examples are Hong Kong, Vancouver and Lyon.

The third group is made up of those cities that show great potential and that, despite their current position in the middle to low area of the index, are evolving positively at great speed (top left quadrant). In this quadrant we can find cities such as Athens, Wrocław and Beijing. Also in this group are a number of Some Latin American cities including Medellín, Cali, Quito, Belo Horizonte, Rio de Janeiro and Curitiba, as well as some from the Middle East such as Dubai.

The final group includes those that are in a vulnerable position (bottom left quadrant), are growing at a slower pace than the rest and are in the middle to low position in the classification. This is the case, for example, of Novosibirsk, Bangkok and Kuala Lumpur.

**Figure 14. Current Position of the Cities in the CIMI and Their Trend**



The information presented in **Figure 14** is complemented by a variance analysis of the dimensions concerning the cities. That is, the aim is to understand not only how much they have grown but also how they have done so. To do this, the variation of the different dimensions has been calculated for each of the cities shown below in **Figure 15**. Those in the bottom part occupy similar positions in all dimensions, so they have a more homogeneous distribution, either because they are stagnant or because they are well balanced. By contrast, the cities at the top reflect heterogeneity in the different areas. In other words, these cities occupy top positions in some dimensions at the same time as very poor ones in others. In this group are the unbalanced cities that perform poorly in the majority of the dimensions, but stand out in one or more of them. On the other hand, differentiated cities achieve good positions in most dimensions while performing poorly in one or more. In **Figure 15** we can see which cities belong to each of the categories.

The first category consists of “balanced” cities (bottom right quadrant)—that is, the ones in the upper middle part of the table that enjoy relatively high values in all the dimensions. Within this category are, among others, Amsterdam, Seoul, Singapore, Madrid, Lyon, Hamburg, London, Tokyo, Montreal and Toronto.

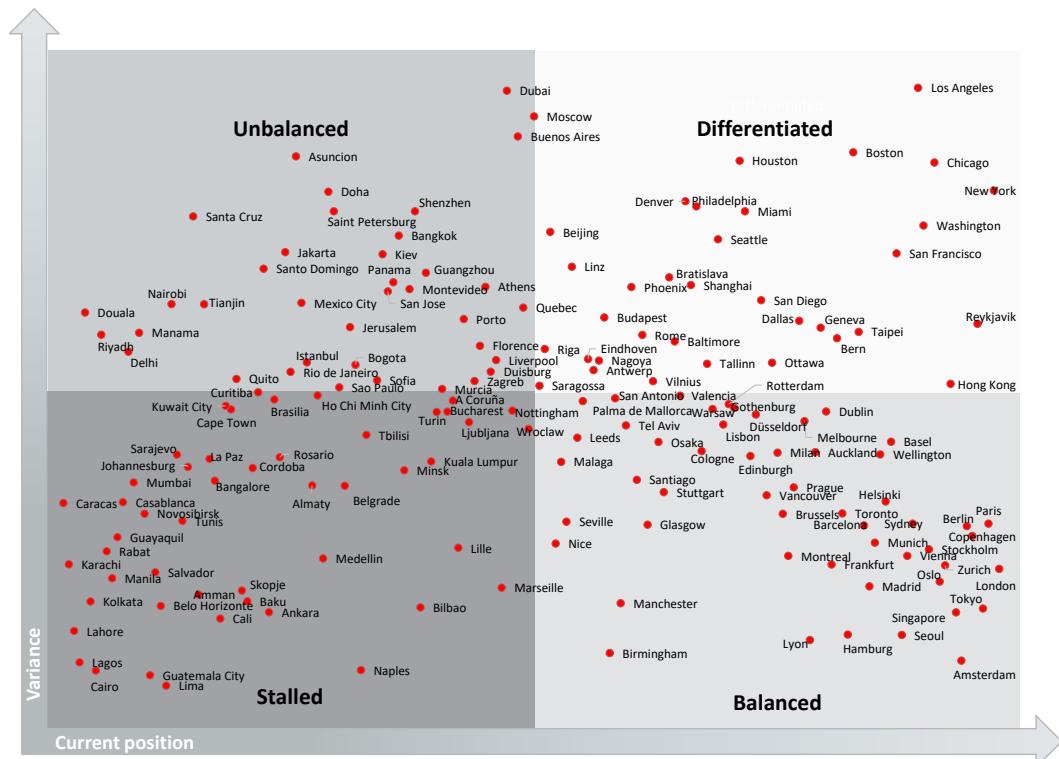
The second category comprises the “differentiated” cities (top right quadrant)—that is, the ones in high positions in the ranking that achieve very good results in several dimensions but relatively poor ones in others. One example is New York City, which is among the top positions

in seven of the nine dimensions but occupies one of the lowest with regard to social cohesion. Another example is Los Angeles, which ranks among the top positions in the economy, human capital and governance, but among the lowest with regard to the environment and to mobility and transportation. Also in this category we find cities such as Boston, Houston, Chicago and Washington.

The third quadrant (top left quadrant) corresponds to the “unbalanced” cities—that is, the ones in the bottom positions of the ranking but which stand out in one field in particular. Examples are this are Doha, Asunción and Shenzhen, which, despite being in worse than position 100 in most of the dimensions, stand out in a particular dimension. For example, Asunción stands out in the environment (position 9), Doha in economy (18) and Shenzhen in mobility and transportation (15). Other cities in this category are Santa Cruz, Saint Petersburg, Jakarta and Bangkok.

In the fourth and final quadrant (bottom left) are the “stagnant” cities, which achieve poor results in almost all the areas analyzed. One example is the city of Skopje, which is below position 100 in six of the nine dimensions. Other examples in this category are Lima, Guatemala, Cairo and Ankara.

**Figure 15. Variance Between the Cities' Dimensions**





## Recommendations and Conclusions

The **CIMI** synthetic index provides us with a ranking of cities taking into account various aspects. The different dimensions analyzed offer a broad and holistic vision of what a city represents, while allowing greater understanding of its composition and its evolution over time.

This year, we would like to interpret the results of the index by contextualizing them in the current global health-care emergency situation. These results and our experience of using it to assess different cities allow us to make the following recommendations and reach some important conclusions:

**People first.** The COVID-19 crisis has made it clear that cities suffer if their citizens do, and that without the well-being of the latter, they are merely empty structures. Their design should therefore focus on quality of life. To accomplish this, it will be necessary to promote human development policies that allow access to decent jobs. Ensuring that no one is left behind in the social sphere will be key to achieving a fair recovery. In this sense, cities should place particular emphasis on the joint advancement of the dimensions of social cohesion and economy.

**Identify what is essential in your city.** If we have learned anything from the COVID-19 pandemic, it is to identify what is truly important and essential. In this sense, cities must work to identify those aspects that they consider to be priorities and that need to receive the highest level of resources, time and effort. For this, they must carry out a far-reaching diagnosis. In this regard, the **CIMI** may be used as a good diagnostic tool to carry out a first assessment of the current status of the city in the different dimensions of our model. It also allows a quick X-ray to be taken of the cities, identifying their strengths and

pointing out the dimensions where there is room for improvement.

**New strategies for a new environment.** The COVID-19 pandemic will impose a new future on cities that will change things as we have known them. For example, social distancing measures will make low-cost mass tourism no longer an option for many cities; traditional retail will compete with a strengthened online one; public transportation will have to be redesigned to ensure the minimum distance between passengers; and the interaction between citizens in green spaces may change. These and many other aspects will render existing strategic plans obsolete. Cities will have to redefine their strategies in order to adapt to the new uncertain scenario.

**Resilience as a new urban paradigm.** Until now, the concept of urban resilience was restricted to natural disaster scenarios. However, the coronavirus pandemic has shown that the ability of cities to overcome traumatic circumstances will be part of their strategic reflections on the urban agenda. In this sense, we consider it essential to promote a new focus on urban resilience, to be achieved by combining a solid infrastructure with flexible and efficient management.

**Recovery through collaboration.** The return to normality and the restoration of urban dynamism will be achievable more quickly if all social actors—the public sector, private companies, civic organizations and academic institutions—collaborate with this common objective. Our experience with **IESE Cities in Motion** and the associated **PPP for Cities** platform ([www.pppcities.org](http://www.pppcities.org)) tells us that the challenges facing us are too big to be tackled individually and that collaboration between different social agents will be needed in order to properly manage them. This cooperation may take various formats (from PPPs to citizen participation structures), but whatever they are, they are essential to achieve long-term success. Notions of collaboration and cooperation should prevail in the

debate about social and economic recovery, seeking to break “silos” that prevent relationships and possible synergies between social actors being seen.

**Link between territories.** Recent decades have seen the growing hegemony of the city, to the detriment of the countryside. However, during the health crisis, the high level of interrelation and dependency between the two areas has become clear. In particular, during the lockdown it has been possible to feel just how important the countryside is for cities: urban residents have seen how, despite social distancing measures, they could still access rurally sourced products in the usual way. This reality invites us to reconsider, value and strengthen the links between rural and urban territories, if we intend to create more efficient systems.

Economic and social recovery after COVID-19 will probably be the most significant challenge of our generation. Given how important cities are, they play a vital role in the regeneration of conditions for allowing this recovery to be rapid, effective and based on solidarity. This will require city managers capable of leading by example, guided by the principles of justice and collaboration, and with a vision of the future that includes all citizens. Ultimately, we will need urban managers who apply the concept of smart governance, which includes accurate diagnosis, clear vision and multidimensional management of challenges. In this sense, we trust that this report will help achieve better governance, which will undoubtedly translate into greater well-being for citizens.

# Appendix 1. Indicators

Nº	Indicator	Description / Unit of measurement	Source	Dimension
1	Secondary or higher education	Proportion of population with secondary and higher education.	Euromonitor	Human capital
2	Schools	Number of public or private schools per city.	OpenStreetMap	Human capital
3	Business schools	Number of business schools in the city that are included in the Top 100 of the Financial Times.	Financial Times	Human capital
4	Expenditure on education	Per capita expenditure on education.	Euromonitor	Human capital
5	Per capita expenditure on leisure and recreation	Annual per capita expenditure on leisure and recreation.	Euromonitor	Human capital
6	Expenditure on leisure and recreation	Expenditure on leisure and recreation as a percentage of GDP.	Euromonitor	Human capital
7	Movement of students	International movement of higher-level students (number of students).	UNESCO	Human capital
8	Museums and art galleries	Number of museums and art galleries per city.	OpenStreetMap	Human capital
9	Number of universities	Number of universities in the top 500.	QS Top Universities	Human capital
10	Theaters	Number of theaters per city.	OpenStreetMap	Human capital
11	Female-friendly	This variable shows whether a city provides a friendly environment for women, on a scale of one to five. Cities with a value of 1 have a more hostile environment for women, while those with a value of 5 are very friendly.	Nomad List	Social cohesion
12	Hospitals	Number of public or private hospitals by city. Includes health centers.	OpenStreetMap	Social cohesion
13	Crime rate	Estimate of the general level of crime in a given city.	Numbeo	Social cohesion
14	Slavery index	This variable represents the response of the national government to situations of slavery in the country. The top ranking countries are those that have the best response to the problem.	Walk Free Foundation	Social cohesion
15	Happiness index	The countries with the highest value in this index are those with the highest degree of overall happiness.	World Happiness Index	Social cohesion
16	Gini index	The Gini index has a scale from 0 to 100, with 0 indicating a situation of perfect equality and 100 one of perfect inequality.	Euromonitor	Social cohesion
17	Peace index	This index (Global Peace Index) is an indicator that measures the level of peace and the absence of violence in a country or region. The bottom-ranking positions correspond to countries with a high level of violence.	Centre for Peace and Conflict Studies at the University of Sydney	Social cohesion
18	Health index	Estimate of the overall quality of the healthcare system, health professionals, equipment, personnel, doctors, costs, etc.	Numbeo	Social cohesion
19	Price of property	Price of property as percentage of income. This is calculated as the relationship between the average price of an apartment and the average annual household disposable income.	Numbeo	Social cohesion
20	Homicide rate	Homicide rate per 100,000 inhabitants.	NomadList	Social cohesion

Nº	Indicator	Description / Unit of measurement	Source	Dimension
21	Death rate	Death rate per 100,000 inhabitants.	Euromonitor	Social cohesion
22	Female employment ratio	Ratio of female workers in the public administration. Between 0 and 1.	International Labor Organization	Social cohesion
23	Suicide rate	Suicide rate per 100,000 inhabitants.	Nomad List	Social cohesion
24	Unemployment rate	The unemployment rate is calculated as (number of unemployed/total workforce) x 100.	Euromonitor	Social cohesion
25	Terrorism	Number of terrorist incidents by city in the last three years.	Global Terrorism Database, University of Maryland	Social cohesion
26	Collaborative economy	Whether the city has Uber and/or Glovo services.	Uber and Glovo.	Economy
27	Ease of starting a business	The top positions in the ranking indicate a more favorable regulatory environment for creating and operating a local company.	World Bank	Economy
28	Mortgage	Mortgage as a percentage of income is the ratio of the real monthly mortgage cost to the family income (the lower, the better).	Numbeo	Economy
29	Motivation that people have to undertake early-stage entrepreneurial activity	Percentage of new entrepreneurs who are motivated by an opportunity for improvement divided by the percentage of new entrepreneurs who are motivated by need.	Global Entrepreneurship Monitor	Economy
30	Number of headquarters	Number of headquarters of publicly traded companies.	Globalization and World Cities (GaWC)	Economy
31	Purchasing power	Purchasing power (determined by the average salary) for the purchase of goods and services in the city, compared with that of New York City. A value of 40 means that inhabitants of that city on an average salary can afford to buy 60% fewer goods and services than the residents of New York.	Numbeo	Economy
32	Productivity	Labor productivity calculated as GDP per working population (in thousands).	Euromonitor	Economy
33	Hourly wage in US dollars	Hourly wage in the city in US dollars.	Euromonitor	Economy
34	Time required to start a business	Number of calendar days needed for a business to be able to operate legally.	Euromonitor	Economy
35	GDP	Gross domestic product in millions of US dollars.	World Bank	Economy
36	GDP per capita	Gross domestic product per capita.	Euromonitor	Economy
37	Estimated GDP	Forecast annual GDP growth for the next year.	Euromonitor	Economy
38	Government buildings	Number of government buildings and premises in the city.	OpenStreetMap	Governance
39	E Government Development Index (EGDI)	The Electronic Government Development Index (EGDI) evaluates the development patterns of websites in a country and incorporates access features, such as infrastructure and educational levels, to reflect how it uses information technology to promote access and social inclusion.	United Nations	Governance
40	Embassies	Number of embassies per city.	OpenStreetMap	Governance

No	Indicator	Description / Unit of measurement	Source	Dimension
41	Employment in the public administration	Percentage of the population employed in public administration and defense; education; healthcare; community, social and personal service activities; and other activities.	Euromonitor	Governance
42	Strength of legal rights index	This index measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate access to loans. The values go from 0 (low) to 12 (high), where the highest ratings indicate that the laws are better designed to expand access to credit.	World Bank	Governance
43	Corruption perceptions index	Countries with values close to 0 are perceived as very corrupt and those with an index close to 100 are perceived as very transparent.	Transparency International	Governance
44	ISO 37120 certification	This establishes whether or not the city has ISO 37120 certification. Certified cities are committed to improving their services and quality of life. This variable is coded on a scale from 0 to 6. Cities that have been certified for the longest time have the highest value; a value of 0 is given to those with no certification.	World Council on City Data (WCCD)	Governance
45	Research centers	Number of research and technology centers per city.	OpenStreetMap	Governance
46	Open data platform	This describes whether the city has an open data system.	CTIC Foundation and Open World Bank	Governance
47	Democracy ranking	The countries in the highest positions are those considered to be the most democratic.	<i>The Economist</i>	Governance
48	Reserves	Total reserves in millions of current US dollars. Estimate at city level according to the population.	World Bank	Governance
49	Reserves per capita	Reserves per capita in millions of current US dollars.	World Bank	Governance
50	Solid waste	Average amount of municipal solid waste generated annually per person (kg/year).	Waste Management for Everyone	Environment
51	Future climate	Percentage of summer temperature increase in the city forecast for 2100 if carbon pollution continues to increase.	Climate Central	Environment
52	CO2 emissions	Carbon dioxide emissions that come from the burning of fossil fuels and the manufacture of cement. Measured in kilotons (kt).	World Bank	Environment
53	Methane emissions	Methane emissions that arise from human activities such as agriculture and the industrial production of methane. Measured in kt of CO2 equivalent.	World Bank	Environment
54	Environmental performance index	Environmental Performance Index (from 1 [poor] to 100 [good]).	Yale University	Environment
55	CO <sub>2</sub> emission index	CO <sub>2</sub> emission index.	Numbeo	Environment
56	Pollution index	Pollution index.	Numbeo	Environment
57	PM <sub>10</sub>	Number of particles in the air with a diameter of less than 10 µm. Annual average.	WHO	Environment
58	PM <sub>2.5</sub>	Number of particles in the air with a diameter of less than 2.5 µm. Annual average.	WHO	Environment
59	Percentage of the population with access to the water supply	Percentage of the population with reasonable access to an appropriate quantity of water resulting from an improvement in the water supply.	World Bank	Environment

Nº	Indicator	Description / Unit of measurement	Source	Dimension
60	Renewable water resources	Total renewable water sources per capita.	FAO	Environment
61	Bicycle rental	Whether the city has a bicycle rental service.	Numo	Mobility and transportation
62	Moped rental	Whether the city has a moped rental service.	Numo	Mobility and transportation
63	Scooter rental	Whether the city has a scooter rental service.	Numo	Mobility and transportation
64	Bicycles per household	Bicycles owned per household.	Euromonitor	Mobility and transportation
65	Bike sharing	This system shows the automated services for the public use of shared bicycles that provide transportation from one location to another within a city. The indicator varies between 0 and 8 according to how developed the system is.	Bike-Sharing World Map	Mobility and transportation
66	Traffic inefficiency index	This index is an estimate of the inefficiencies in traffic. High values represent high rates of inefficiency in driving, such as long journey times.	Numbeo	Mobility and transportation
67	Exponential traffic index	This index is estimated by considering the time spent in traffic. Dissatisfaction with travel times is assumed to increase exponentially beyond 25 minutes.	Numbeo	Mobility and transportation
68	Traffic index	Index of time based on how many minutes it takes to get to work.	Numbeo	Mobility and transportation
69	Length of the metro system	Length of the city's metro system.	Metrobits	Mobility and transportation
70	Metro stations	Number of metro stations per city.	Metrobits	Mobility and transportation
71	High-speed train	Binary variable that shows whether the city has a high-speed train or not.	OpenRailwayMap	Mobility and transportation
72	Commercial vehicles in the city	Number of commercial vehicles in the city.	Euromonitor	Mobility and transportation
73	Flights	Number of incoming flights (air routes) in a city.	OpenFlights	Mobility and transportation
74	Bicycles for rent	Number of bike-rental or bike-sharing points, based on docking stations where bikes can be picked up or dropped off.	OpenStreetMap	Urban planning
75	Buildings	This variable is the number of completed buildings in the city. It includes structures such as high-rise and low-rise buildings but excludes other diverse structures and buildings in different phases of completion (design, construction, etc.).	Skyscraper Source Media	Urban planning
76	Number of people per household	Average number of people per household.	Euromonitor	Urban planning
77	Percentage of the urban population with adequate sanitation services	Percentage of the urban population that uses at least basic sanitation services—that is, improved sanitation facilities that are not shared with other households.	World Bank	Urban planning
78	Buildings over 35 meters high	Number of buildings at least 12 stories or 35 meters high (high-rise).	Skyscraper Source Media	Urban planning
79	Number of passengers per airport	Number of passengers per airport in thousands.	Euromonitor	International projection

Nº	Indicator	Description / Unit of measurement	Source	Dimension
80	Hotels	Number of hotels per capita.	OpenStreetMap	International projection
81	Restaurant index	This index is a comparison of the prices of food and beverages in restaurants and bars in comparison with New York City.	Numbeo	International projection
82	McDonald's	Number of McDonald's restaurants per city.	OpenStreetMap	International projection
83	Number of conferences and meetings	Number of international conferences and meetings that are held in a city.	International Congress and Convention Association	International projection
84	Number of photos of the city uploaded online	Ranking of cities according to the number of photos taken in the city and uploaded online. The top positions correspond to the cities with the most photographs.	Sightsmap	International projection
85	3G coverage	Percentage of the population that has at least 3G coverage.	Euromonitor	Technology
86	Innovation index	The Culture of Innovation Index (ICI) is a ranking of the leading cities in innovation.	2thinknow	Technology
87	Internet	Percentage of households with access to the internet.	Euromonitor	Technology
88	Online banking	Percentage of the population that uses the internet for banking services.	Euromonitor	Technology
89	Online video calls	Percentage of the population using the internet for video calls.	Euromonitor	Technology
90	LTE/WiMAX	Percentage of the population covered by at least one LTE/WiMAX mobile network.	Euromonitor	Technology
91	Mobile phone penetration ratio	Number of landline subscriptions per 100 inhabitants.	International Telecommunication Union	Technology
92	Personal computers	Percentage of households in the city with a personal computer.	Euromonitor	Technology
93	Social networks	Registered Twitter users by city, in thousands of people + number of registered LinkedIn members.	Twitter and LinkedIn	Technology
94	Landline subscriptions	Number of landline subscriptions per 100 inhabitants. IP per capita.	International Telecommunication Union	Technology
95	Broadband subscriptions	Broadband subscriptions per 100 inhabitants.	International Telecommunication Union	Technology
96	Telephony	Percentage of households with some kind of telephone service.	Euromonitor	Technology
97	Mobile telephony	Percentage of households in the city with mobile phones.	Euromonitor	Technology
98	Internet usage away from home and/or office	Percentage of the population that uses the internet away from their home or workplace.	Euromonitor	Technology
99	Internet speed	Average internet speed in the city in Mbps.	Nomad List	Technology
100	Web Index	The Web Index seeks to measure the economic, social and political benefit that countries obtain from the internet.	World Wide Web Foundation	Technology
101	Wi-Fi hotspots	Number of wireless access points globally. This variable represents the options available in the city for connecting to the internet.	WiFi Map app	Technology

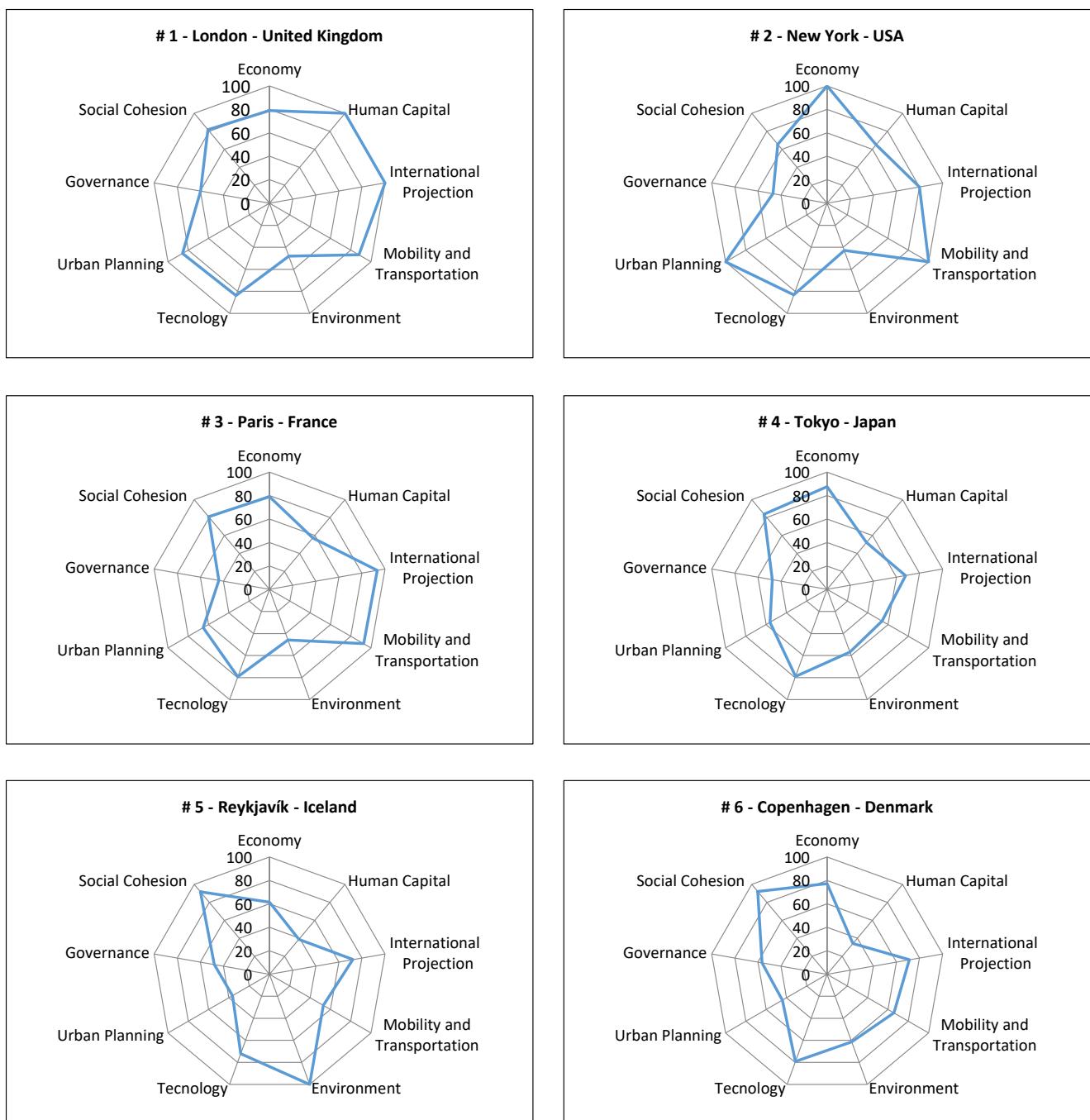
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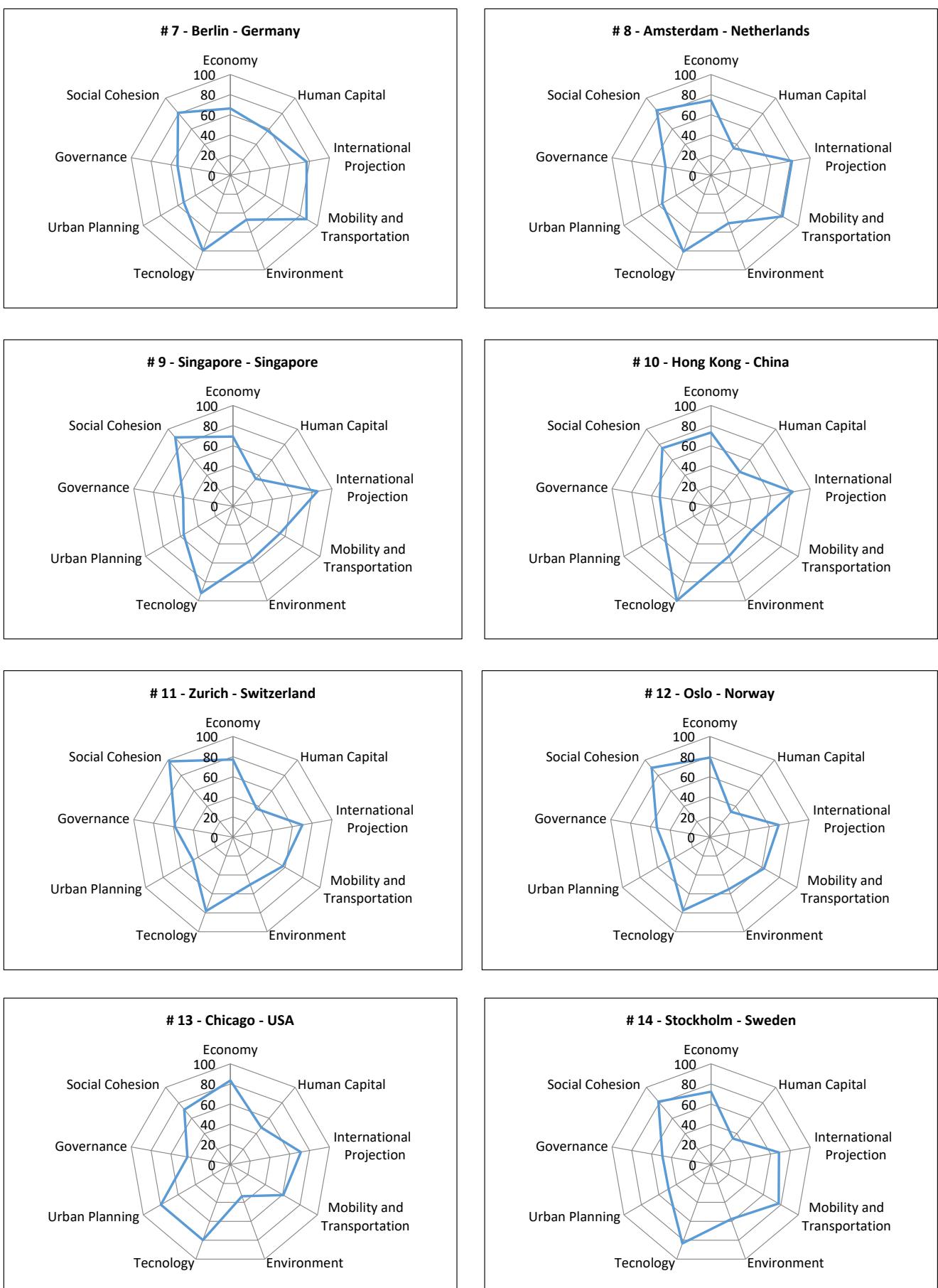
## Appendix 2.

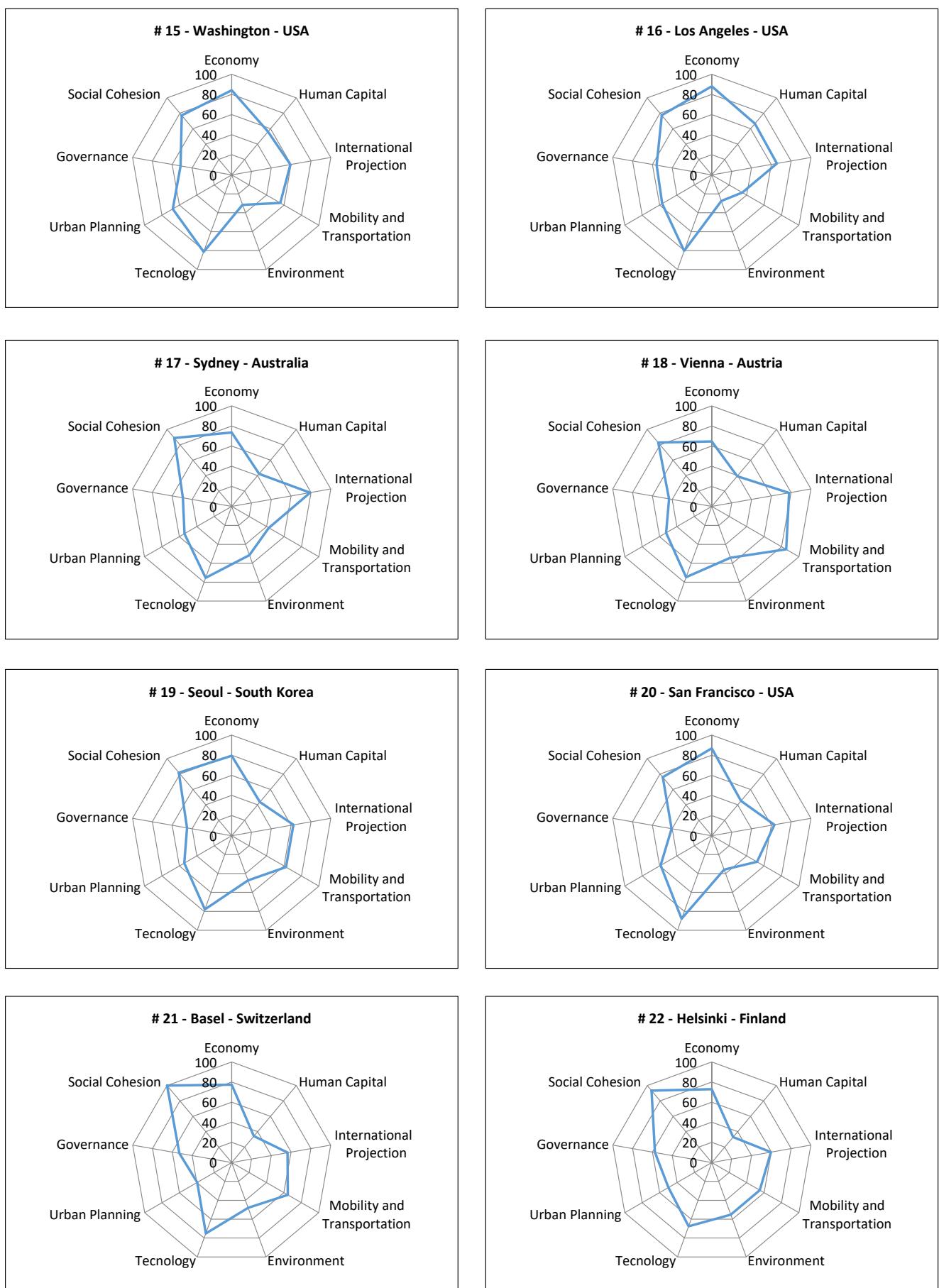
# Graphical Analysis of the Profiles of 174 Cities

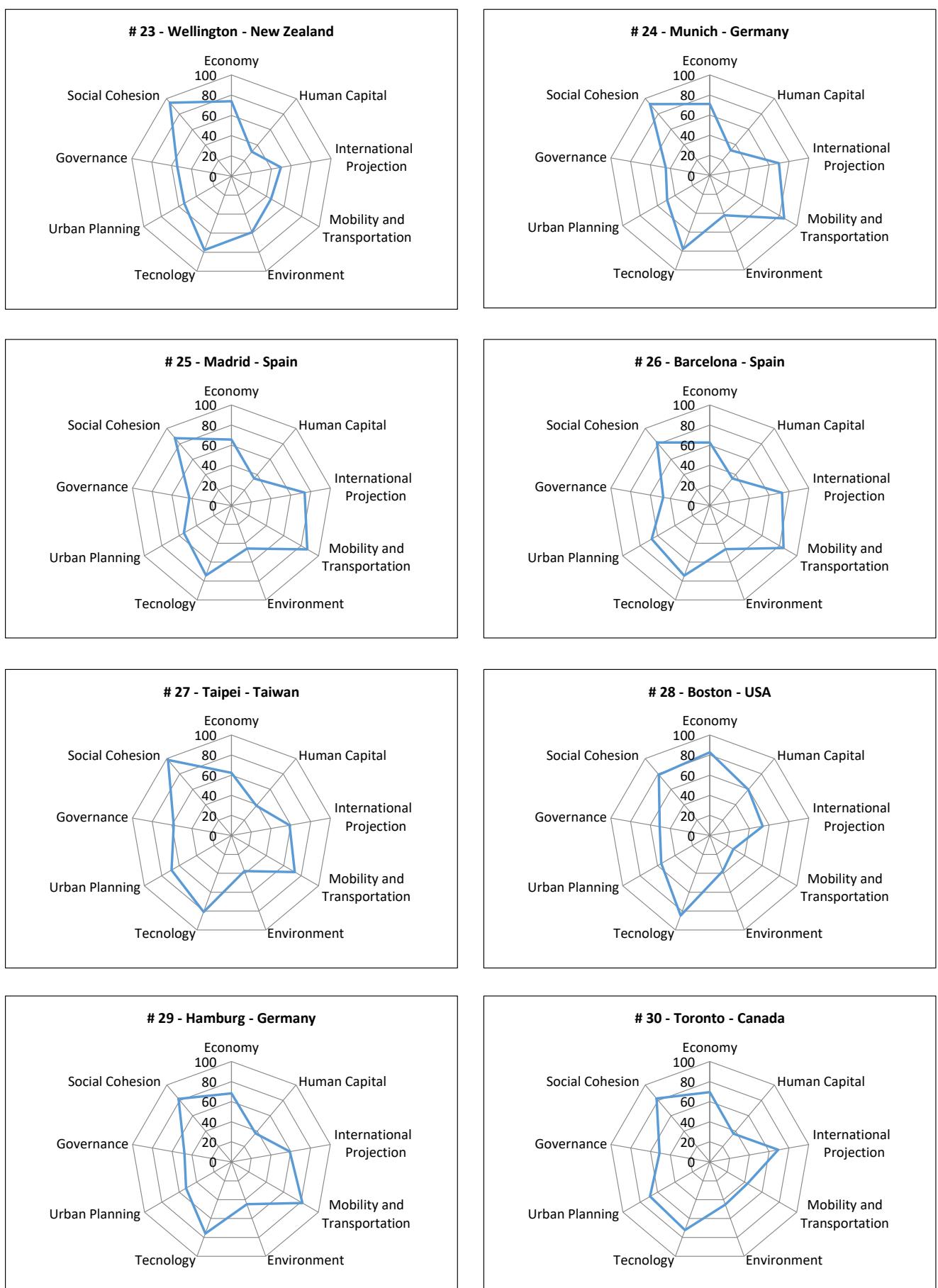
Below is a graphical analysis of the 174 cities included in the **CIMI**, based on the nine key dimensions. These radar charts, arranged according to ranking, aim to facilitate in-

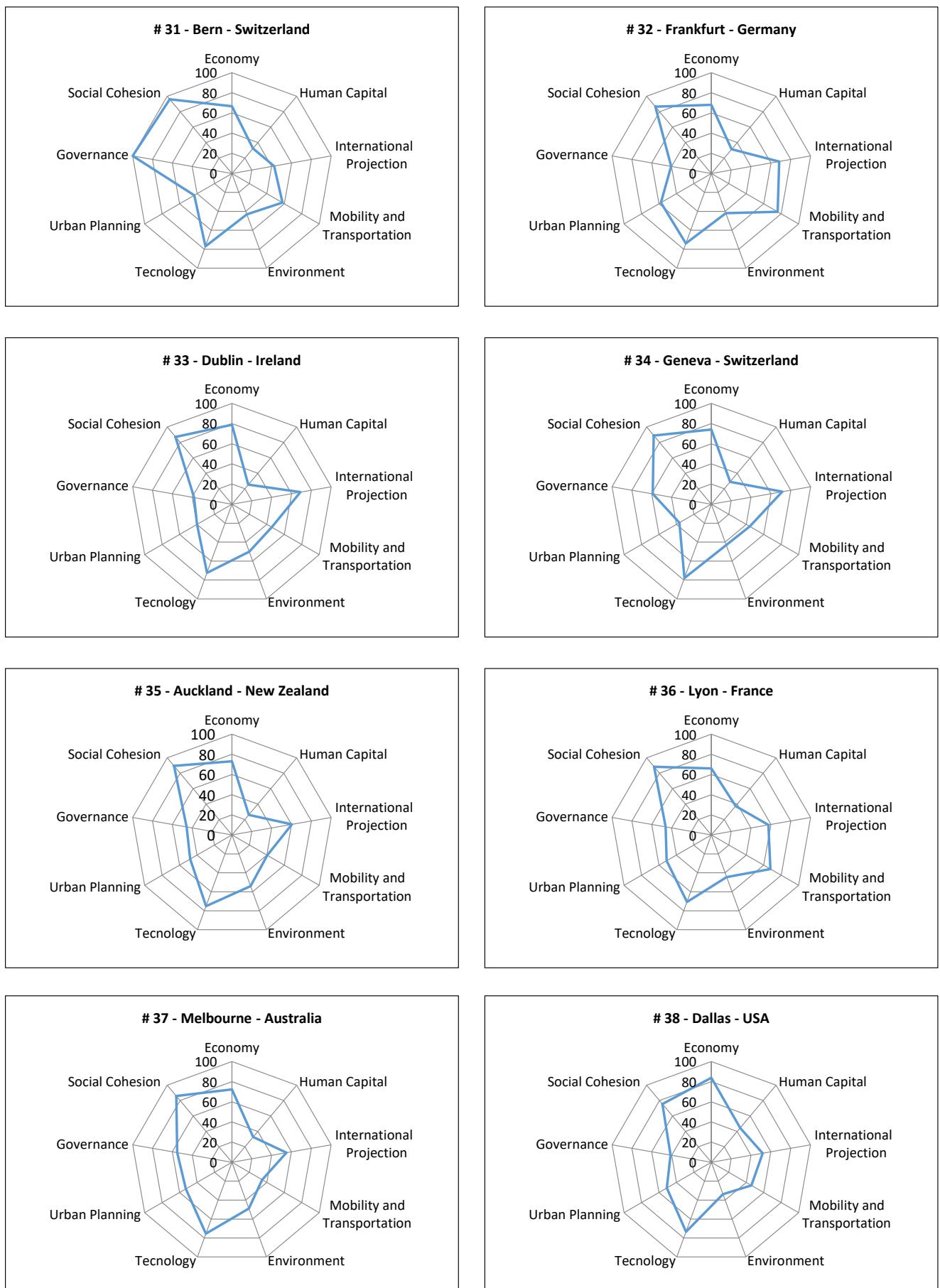
terpretation of each city's profile by identifying the values of the various fields. At the same time, they enable comparisons of two or more cities at a glance.

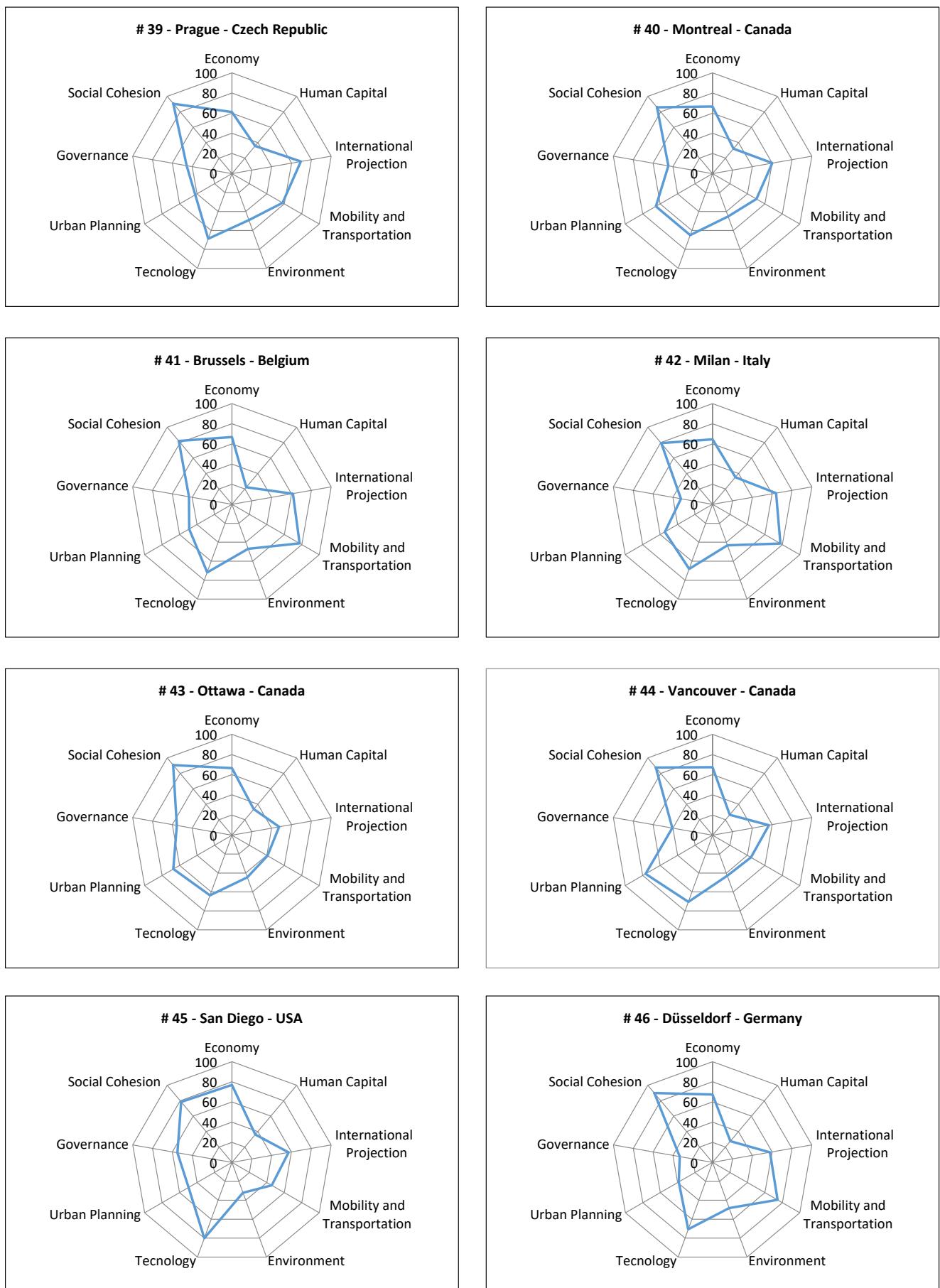


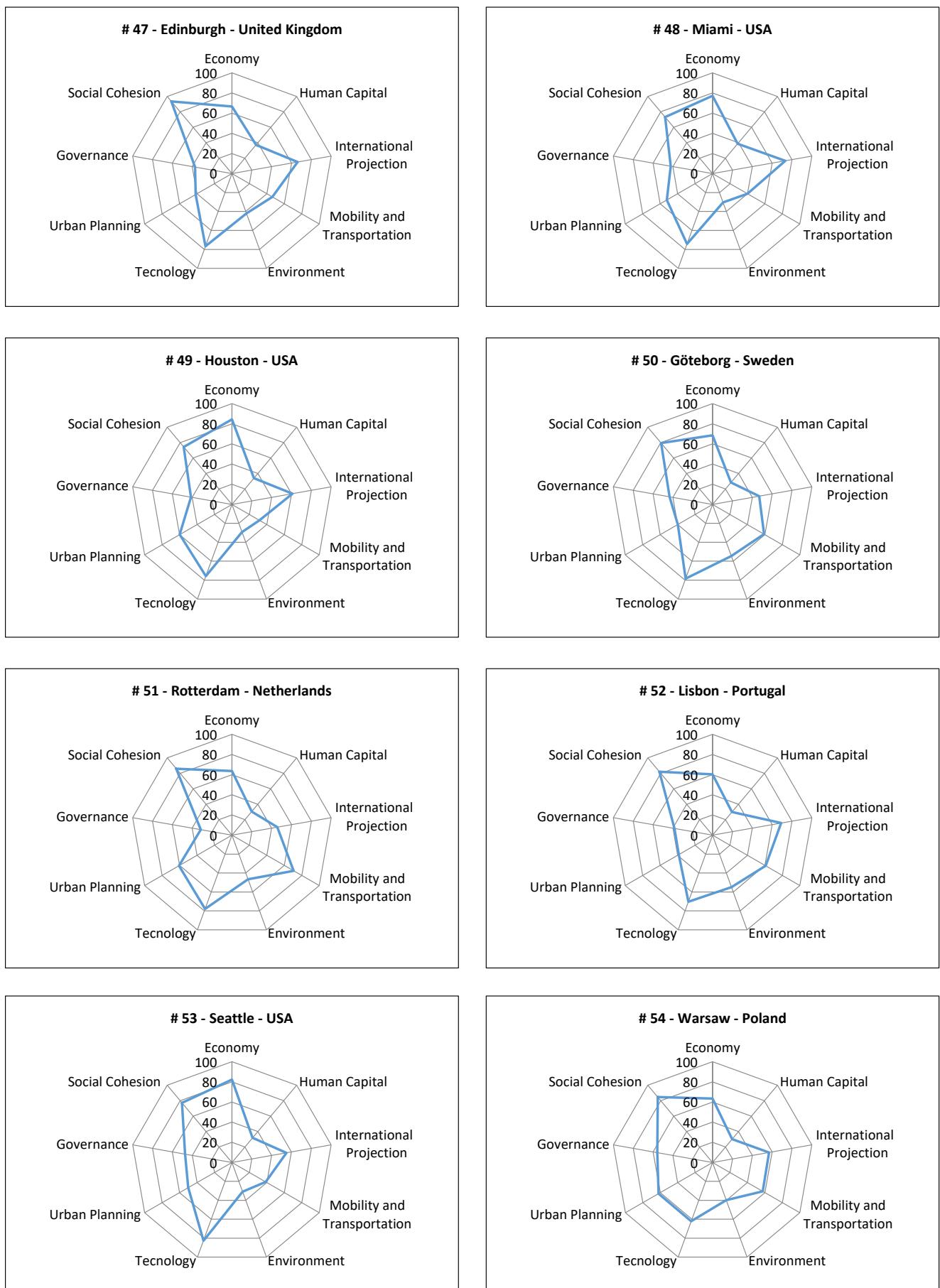


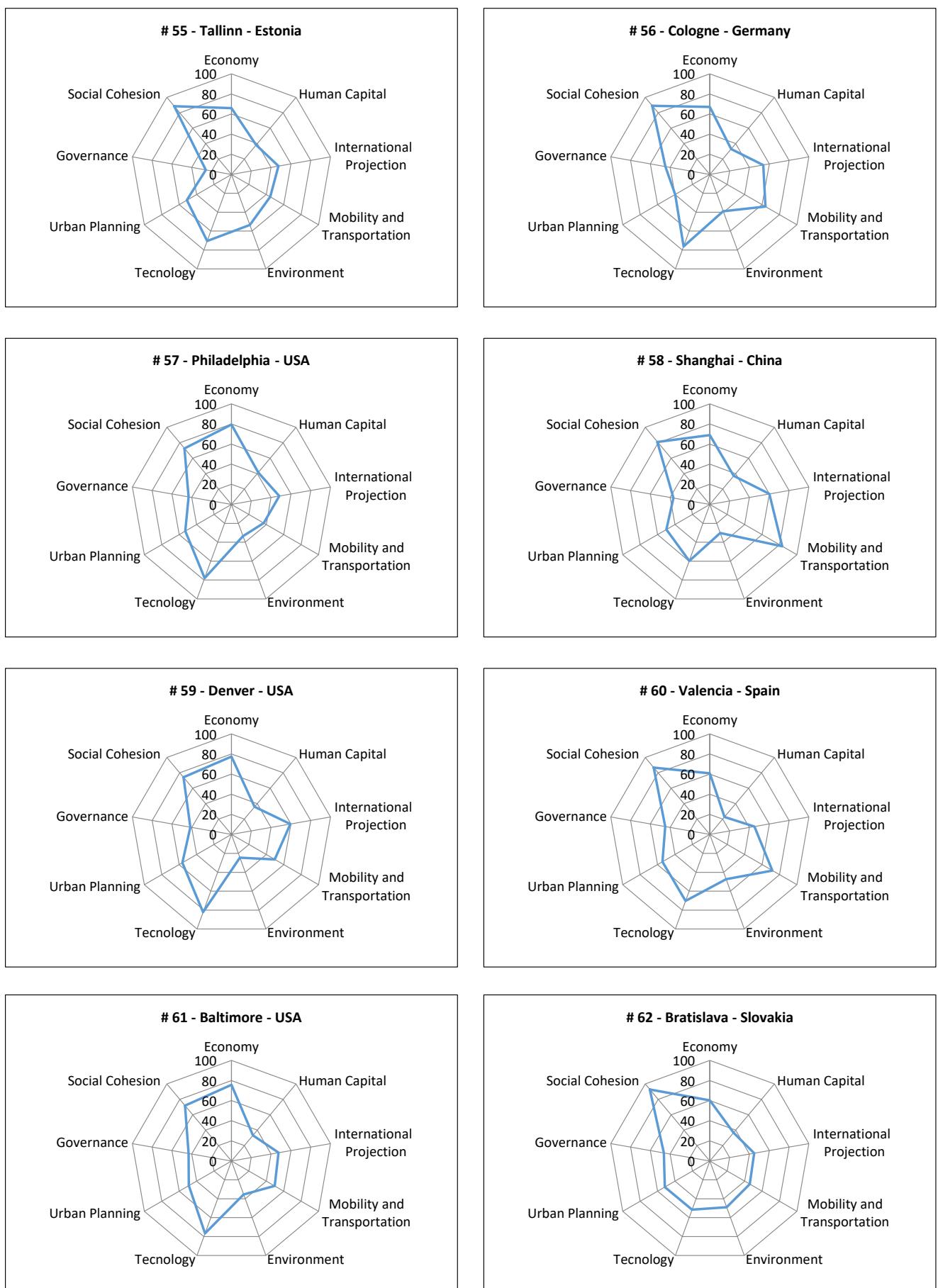


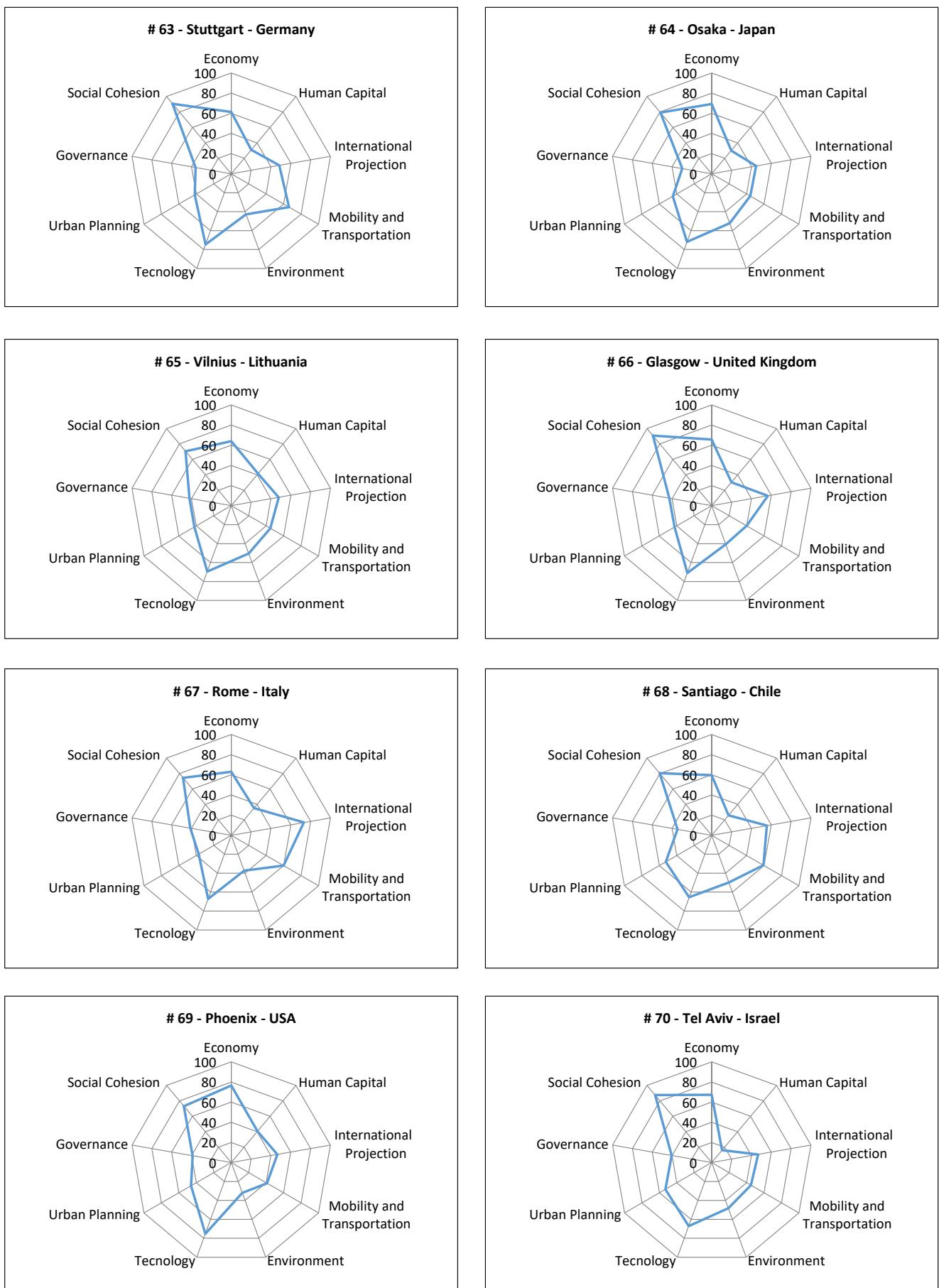


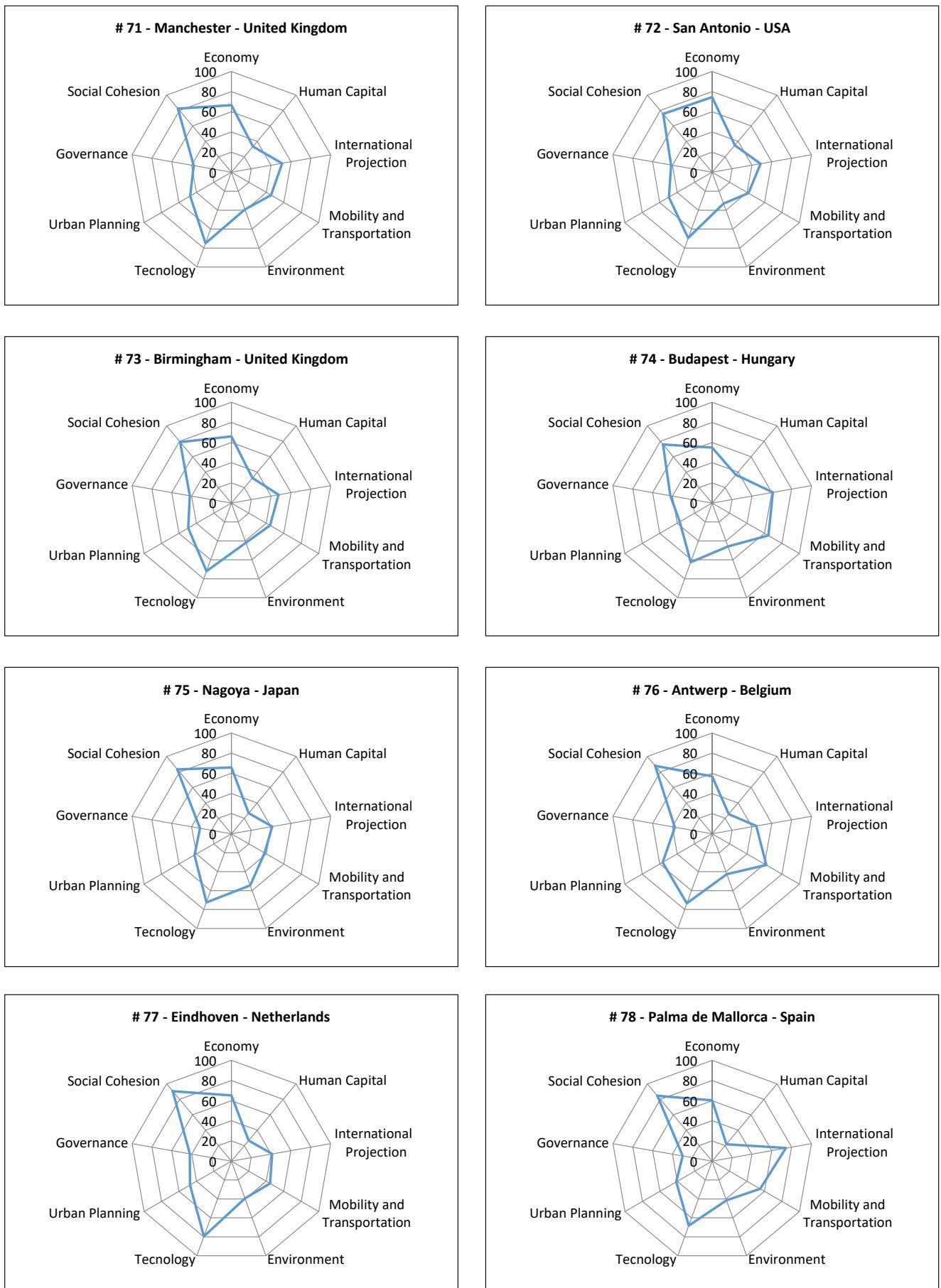


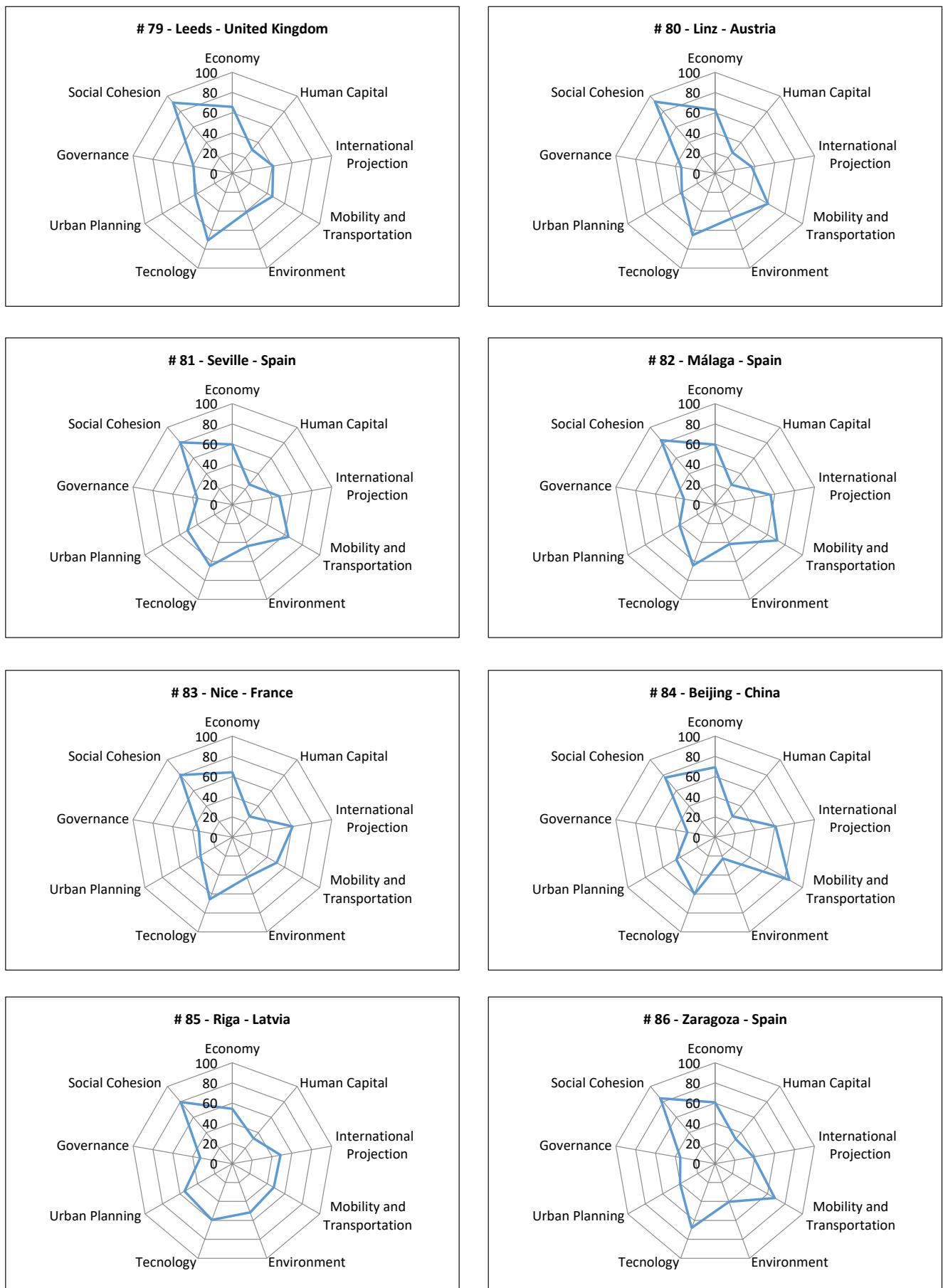


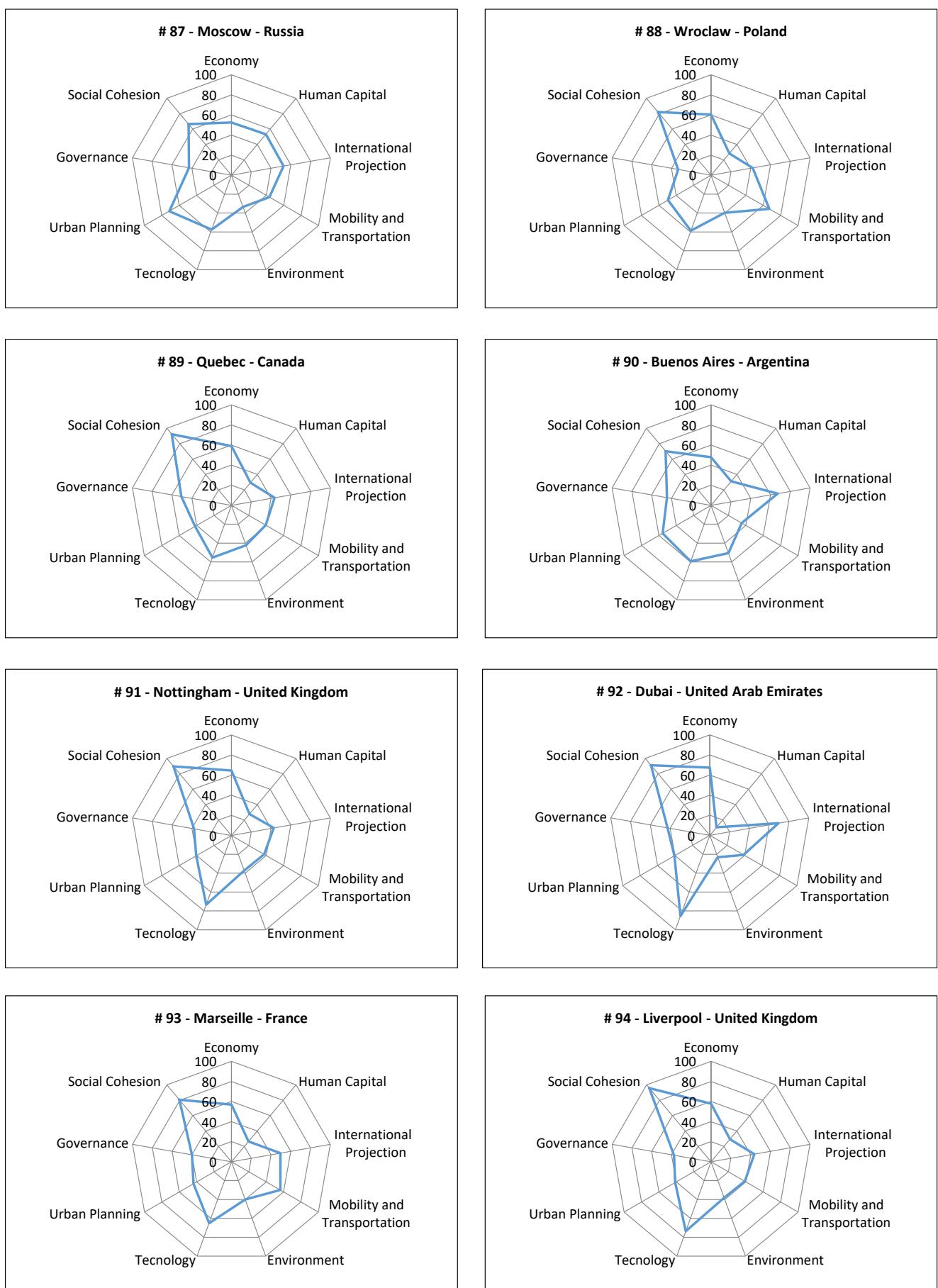


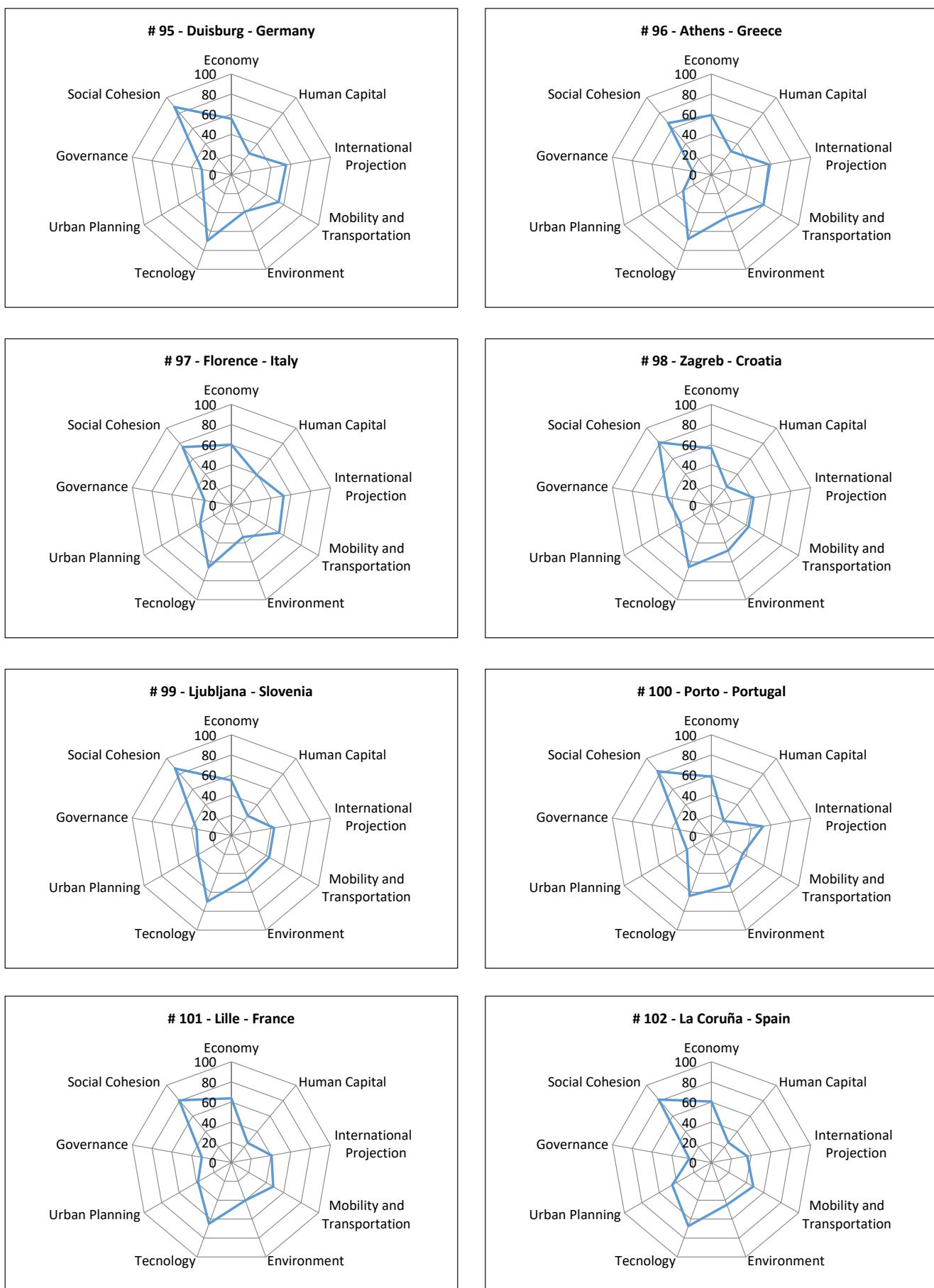


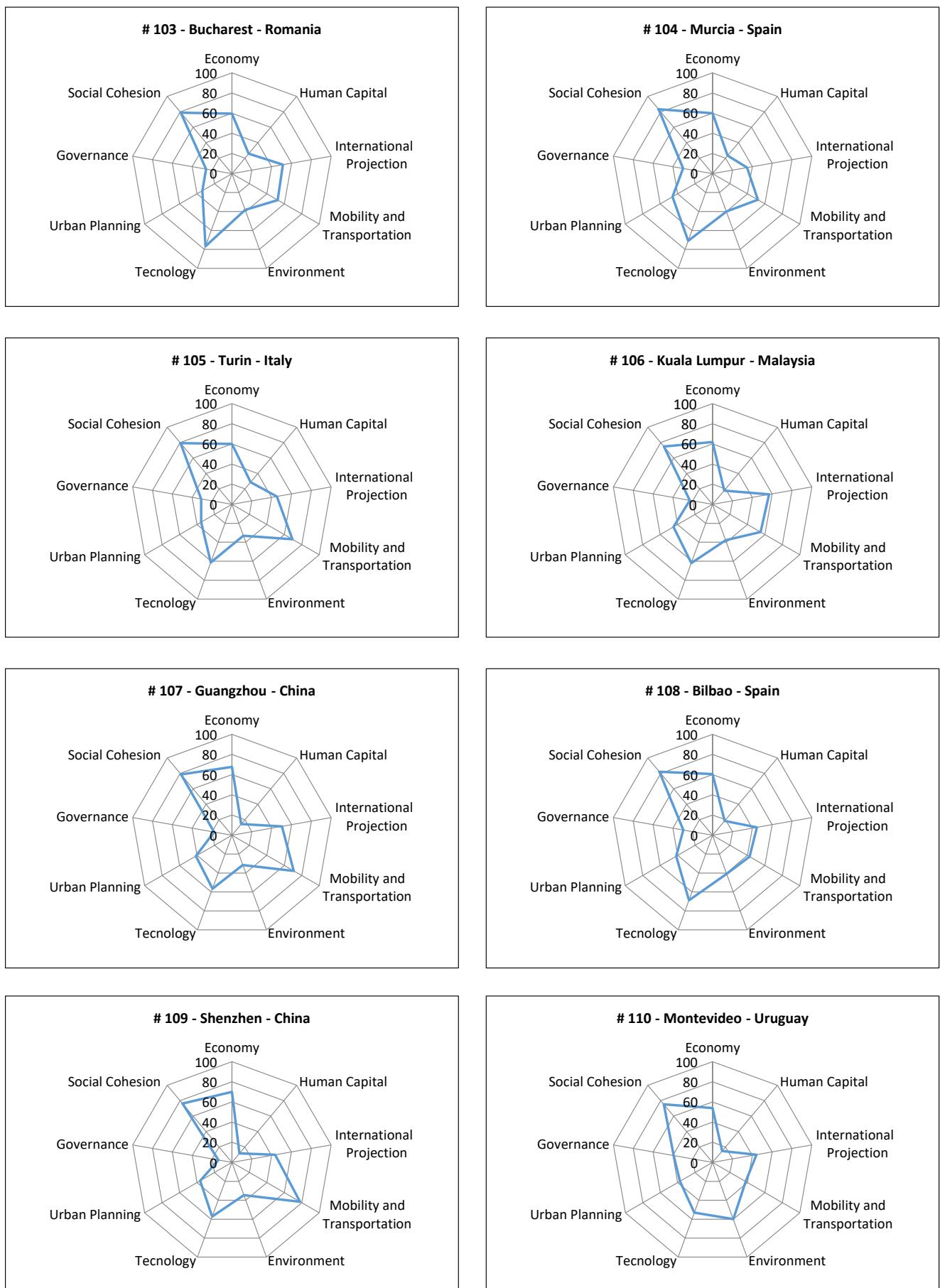


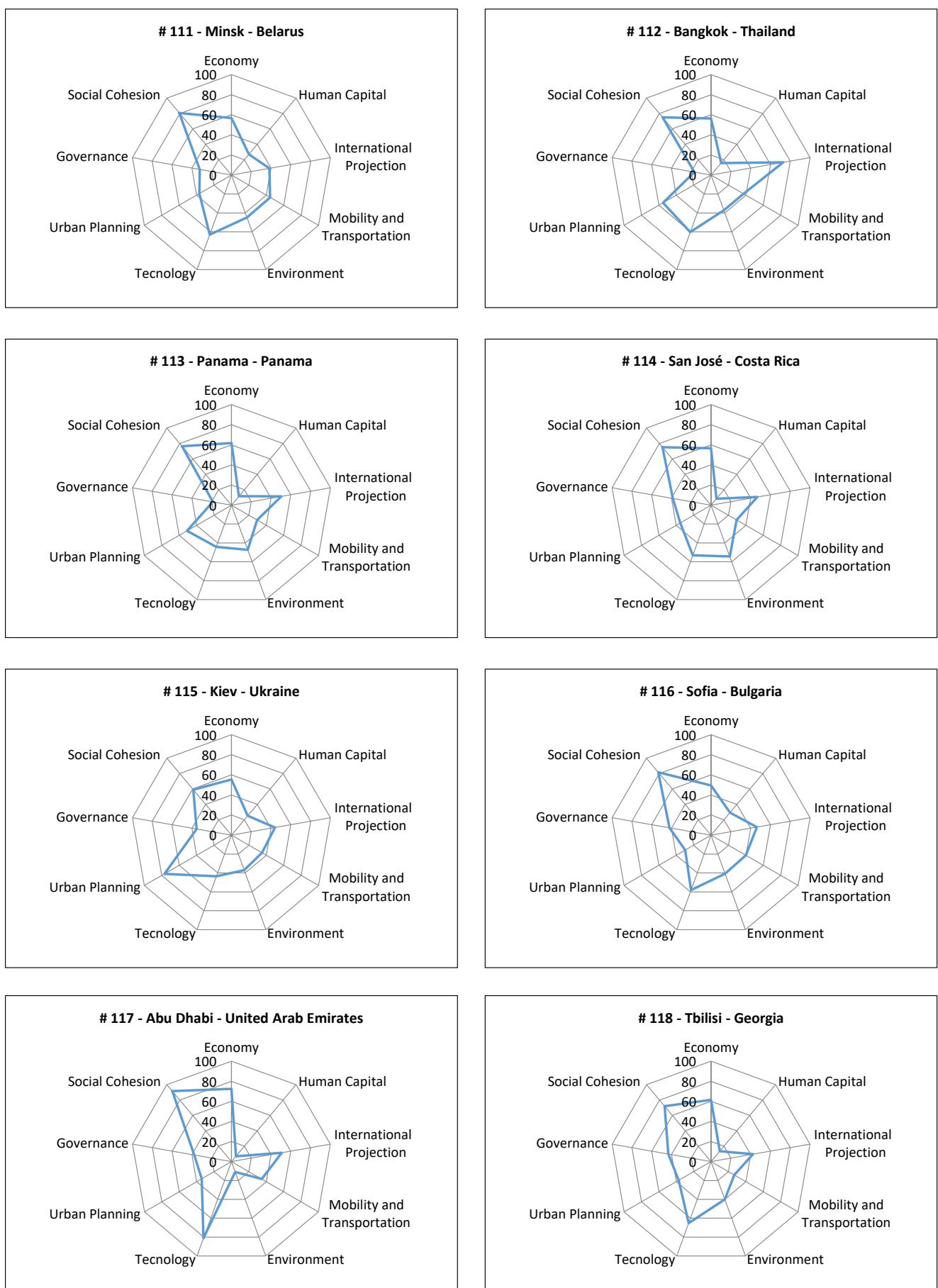


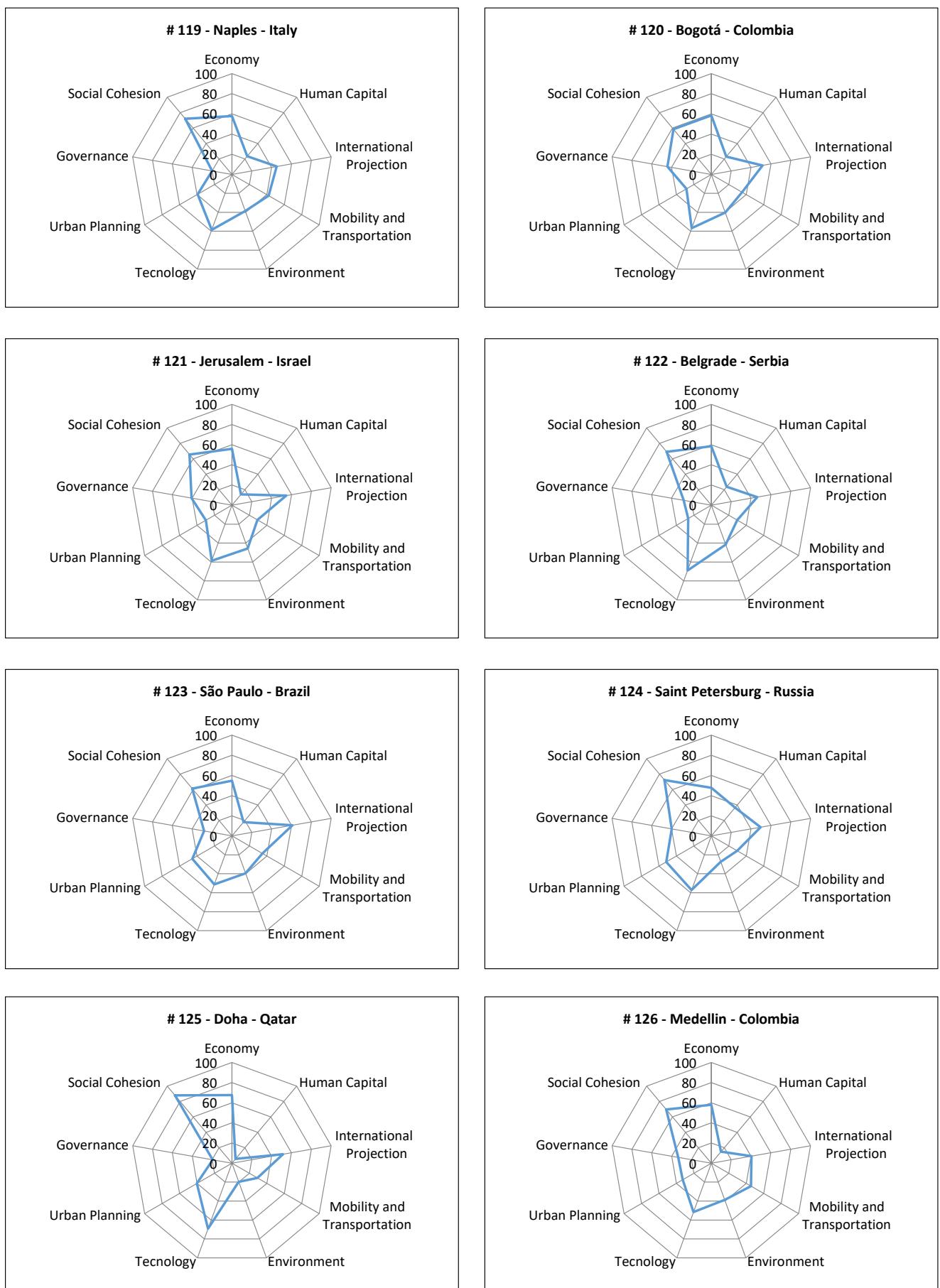


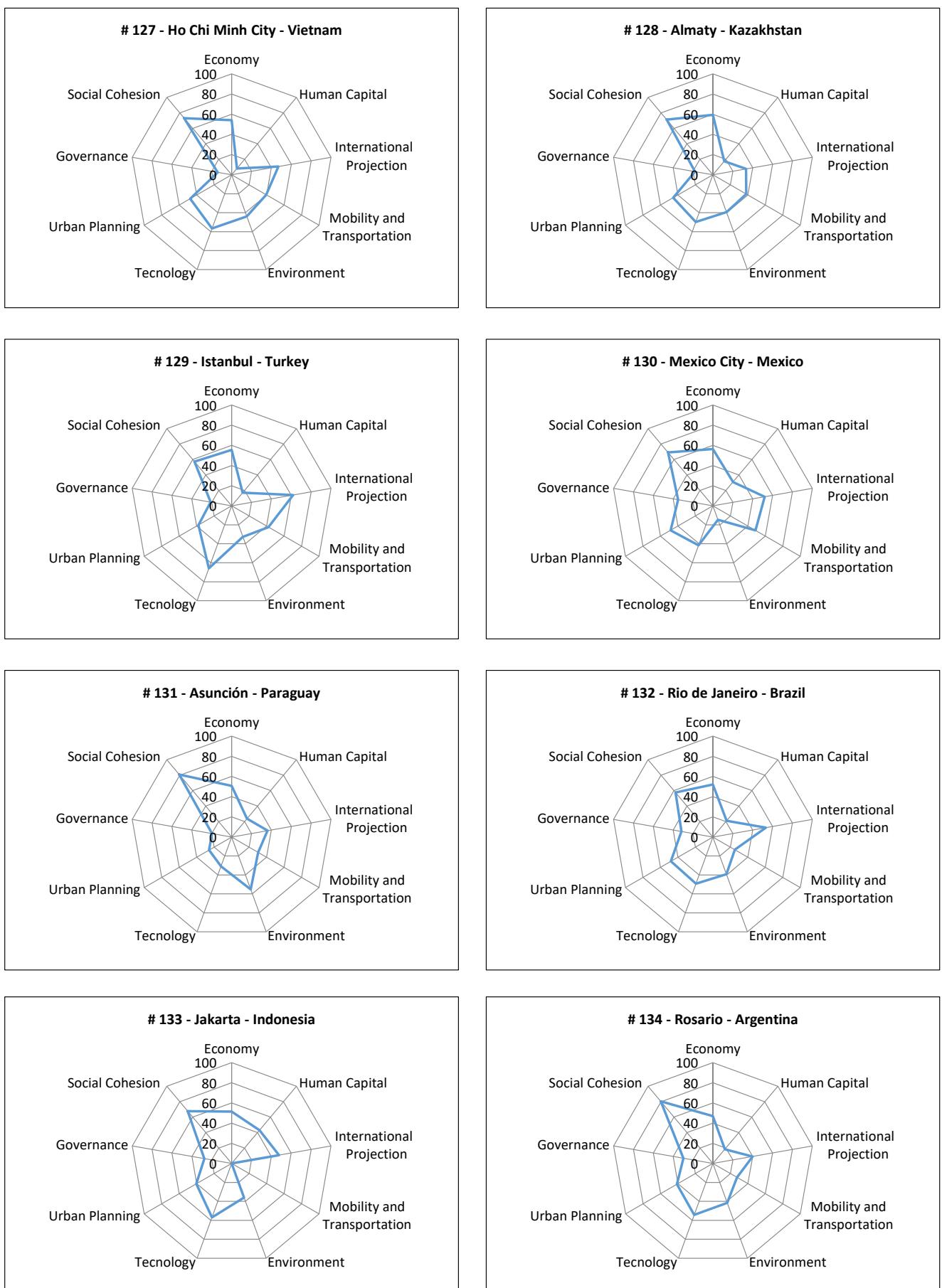


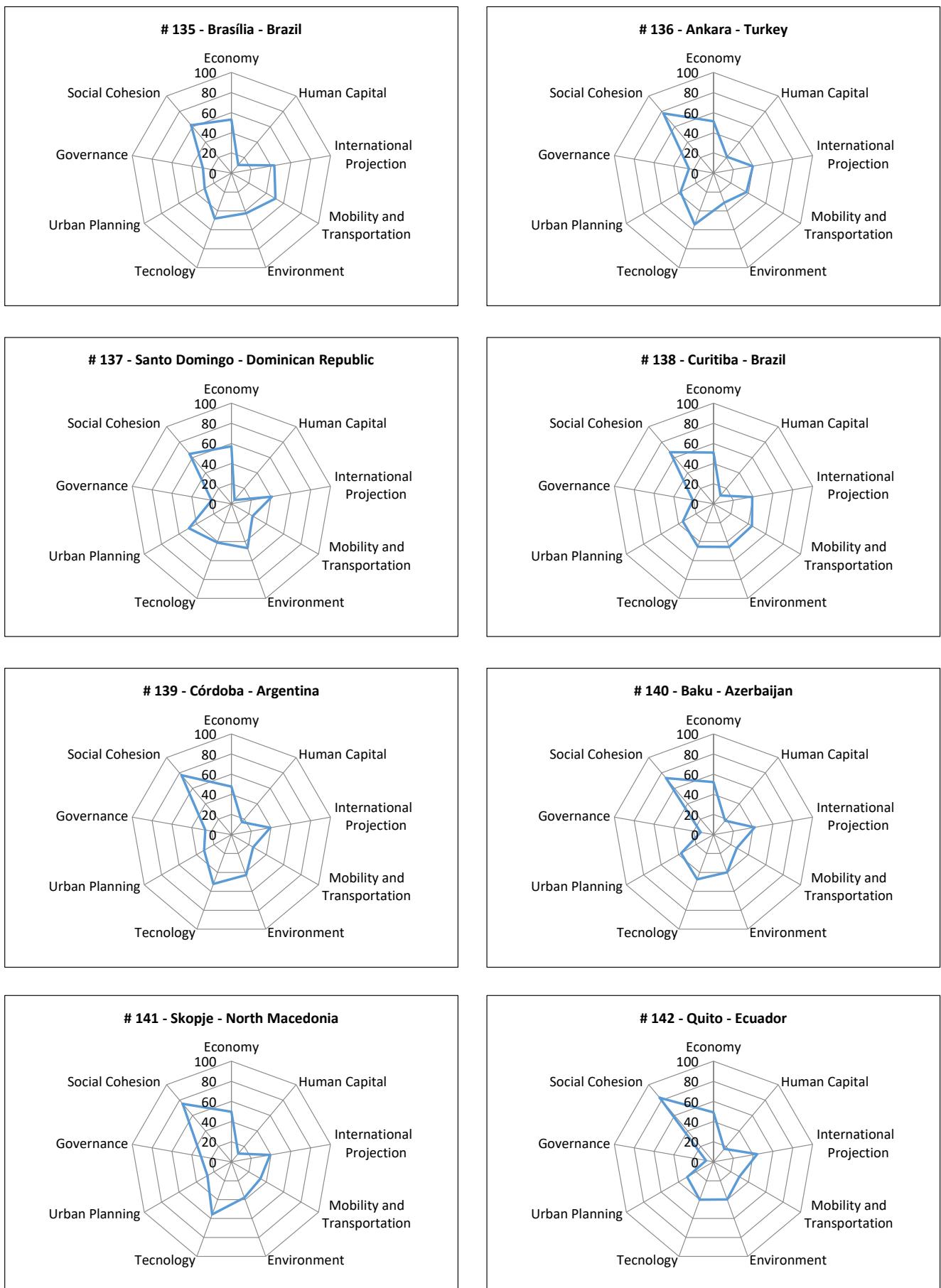


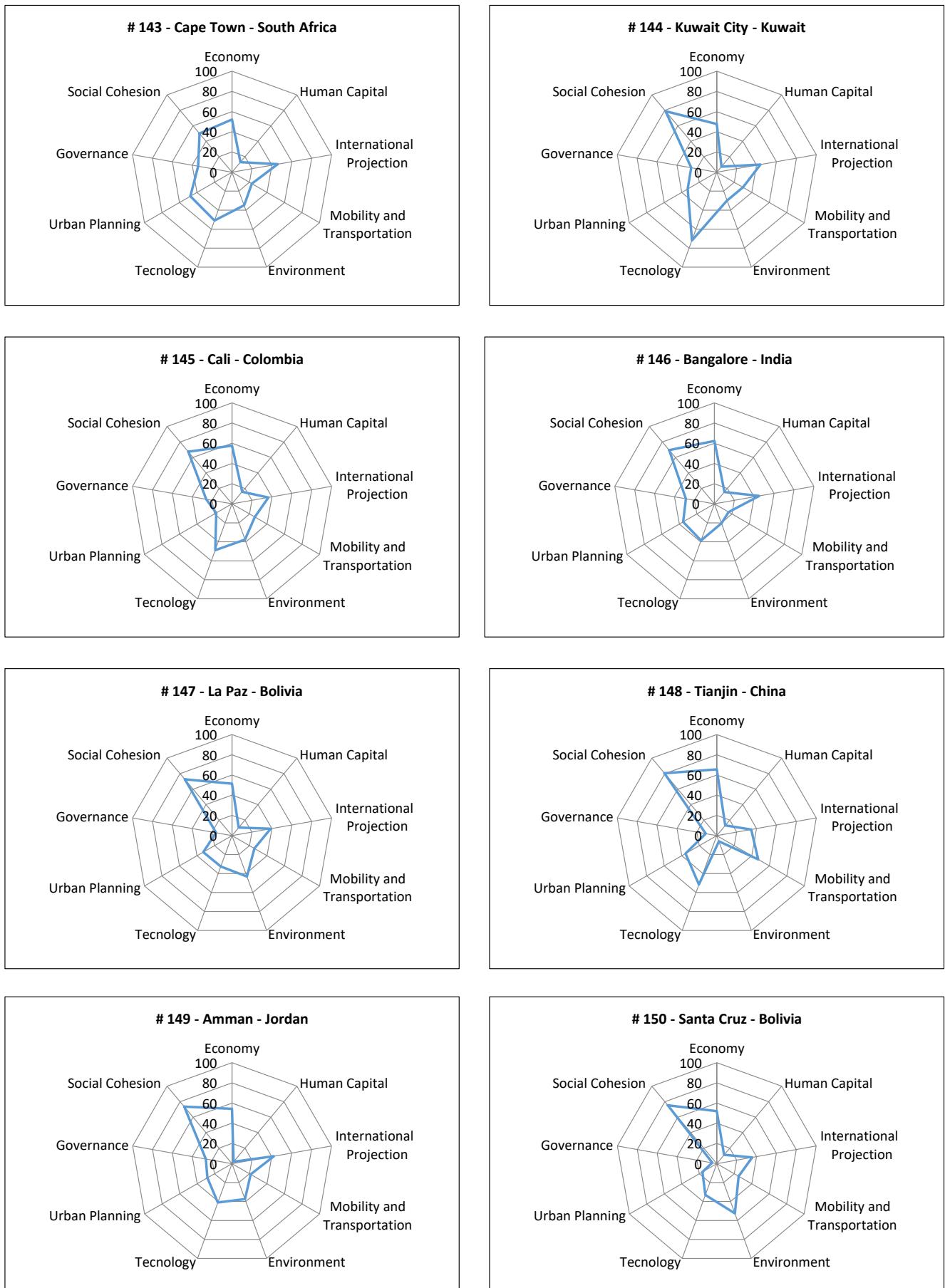


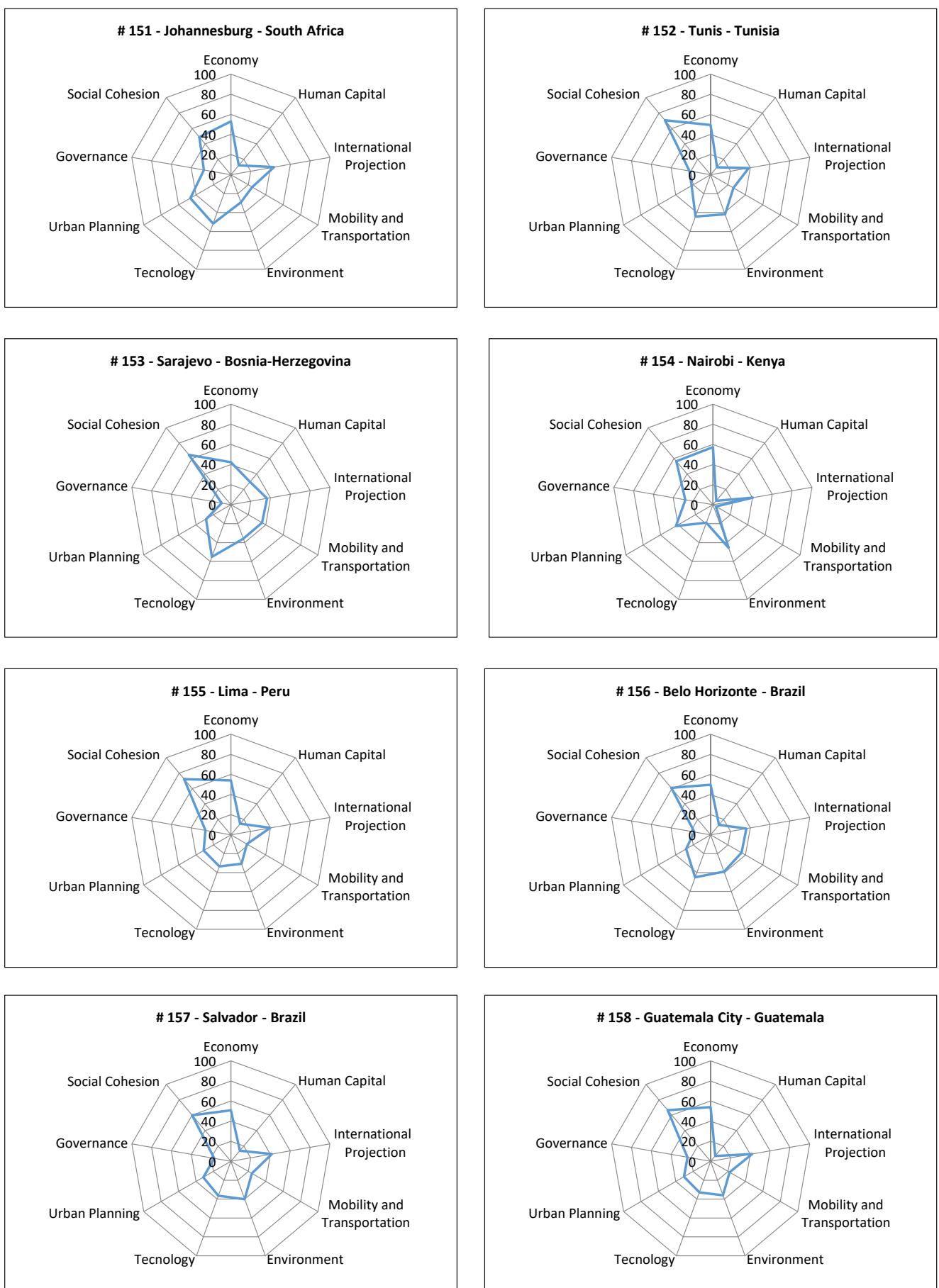


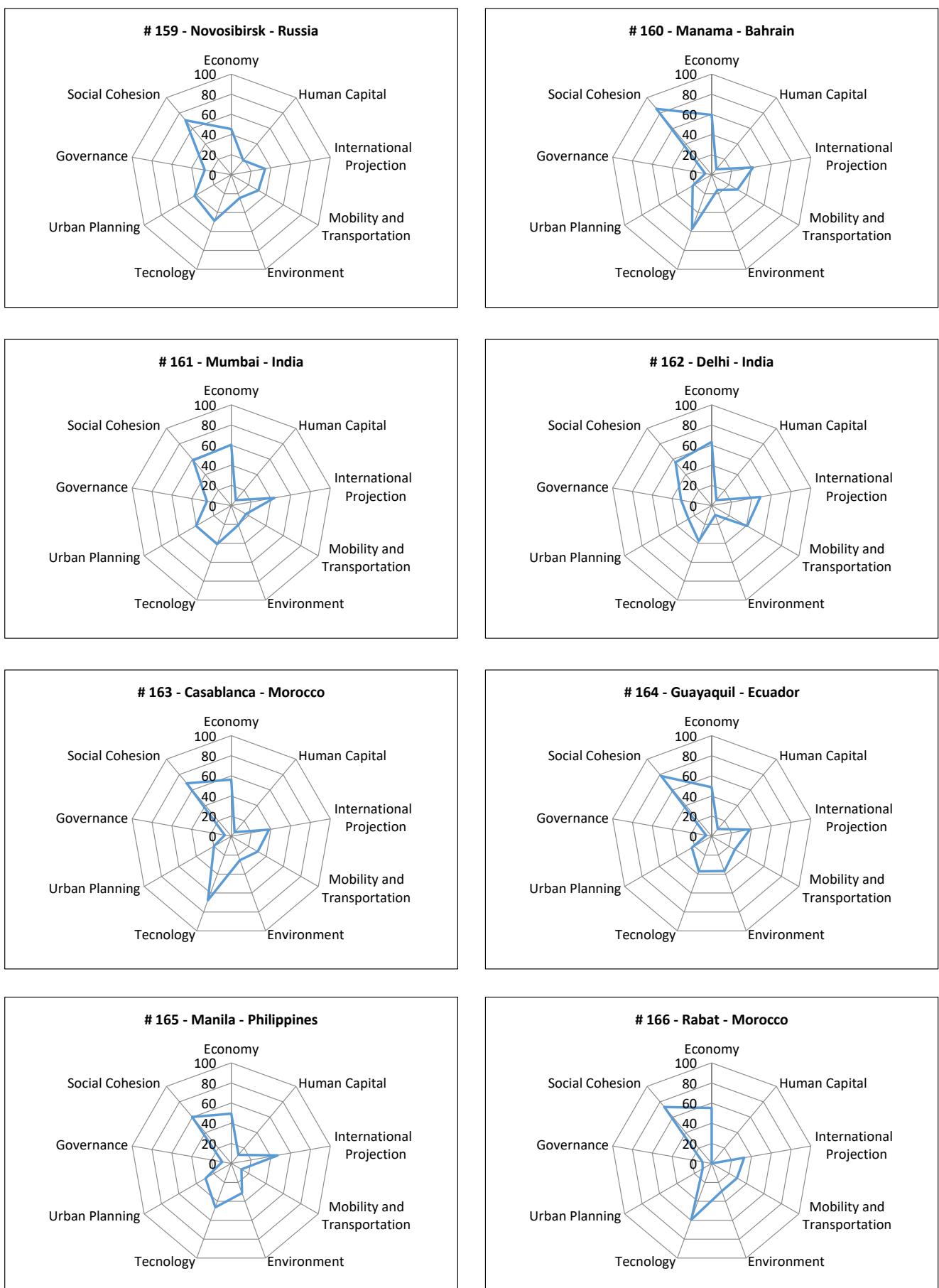


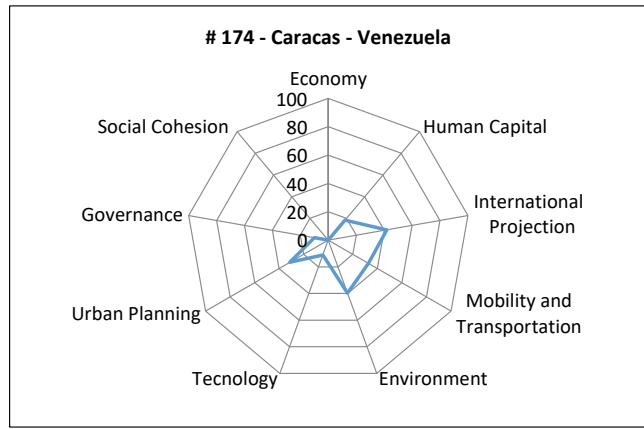
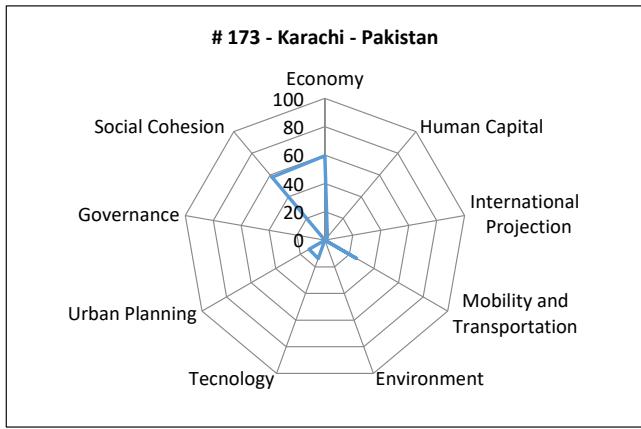
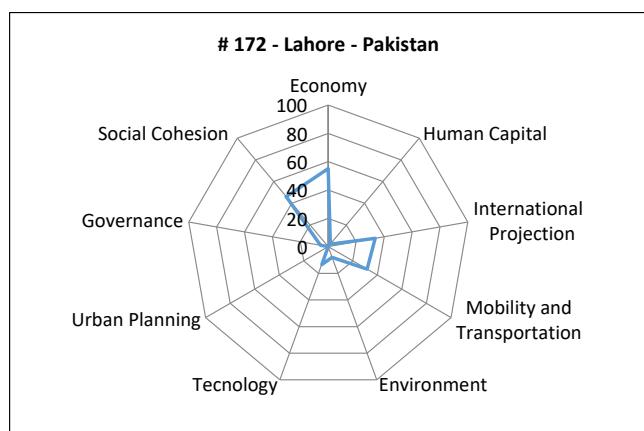
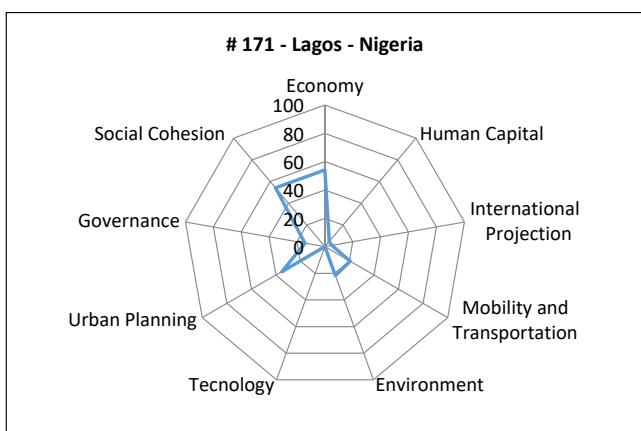
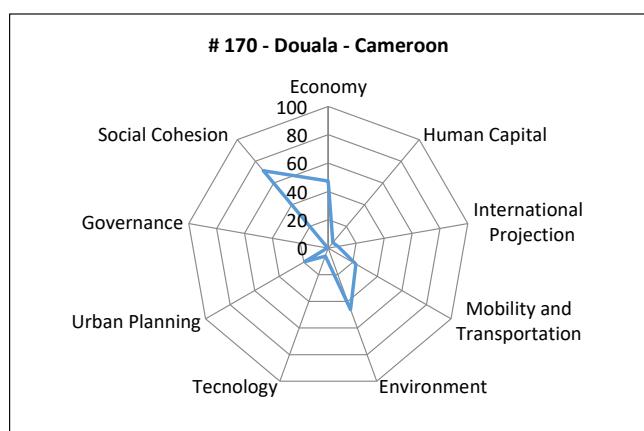
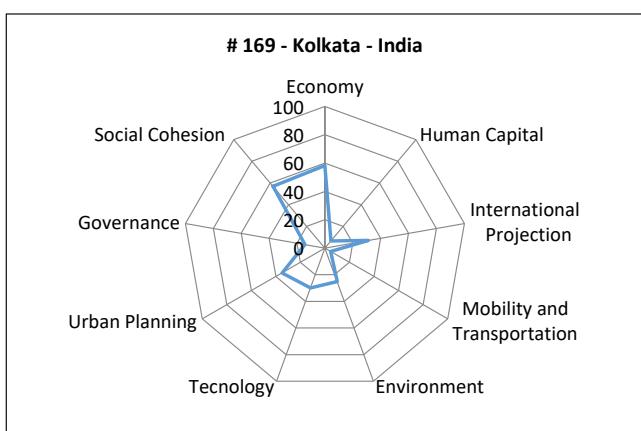
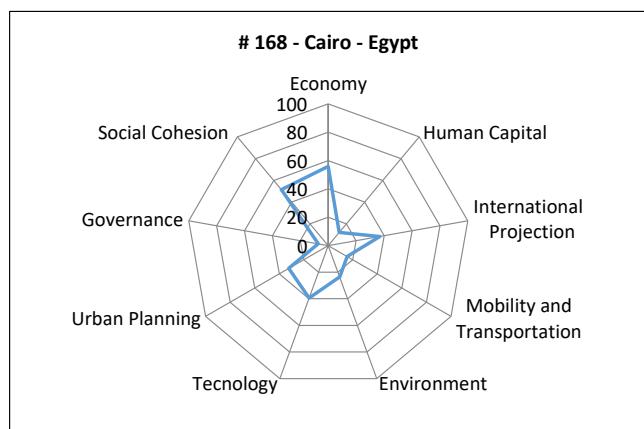
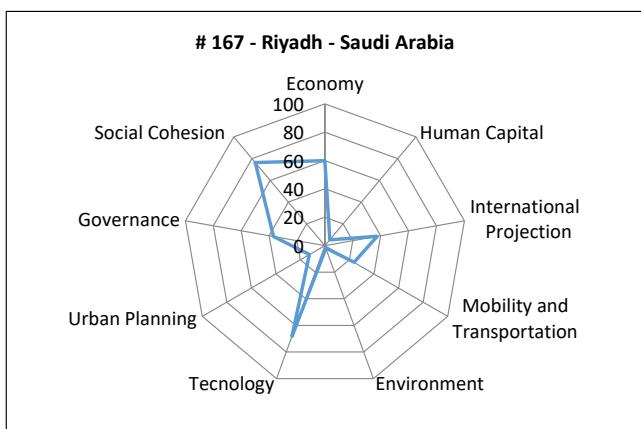
















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