



DATA ANALYSIS AND VISUALIZATION

CA1

A composite indicator for
evaluating countries for
software engineers to
emigrate to

BY

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THE COUNTRIES

The Software Developer Destination Index evaluates and ranks countries based on how attractive and suitable they are to live in for software developers. It looks at a range of different factors across three key sub-indices.

Economic Potential, Living standards and Environmental Quality. This index is built using five indicators: converting salary, purchasing power, quality of life, cost of living and pollution level. These indicators are weighted accordingly to accurately reflect their importance in offering the best overall destination.





Executive Summary

This index will help software engineers find the most attractive countries to work in. As there is a ever growing demand for developers globally This index will provide data driven insight to help software engineers make a informed decision with a consideration of both professional growth and opportunity as well as a high quality of life.



Motivation

Motivation:

The index was create to adress three critical requirements

1. Carrer development - Identify countries that are offering high wages and job potential for software developers
2. Qaulity of life - A high standard on the quality of daily life
3. Personal Relevence - As a soon to be software engineering graduate this analysis will help me choose my own choice for migration post graduation.



Index Composition

Sub- Indices

1. Economic Potential (Salary + Purchasing power) - 40%
2. Living Standards (Quality of Life + Cost_of_Living_Value) - 35%
3. Enviornmental Quality (Pollution Value) - 25%

By looking at these factors the Software engineering migration index will be able to compare countries as potential destinations fot software engineers.

KEY FINDINGS

Two central European countries dominate the index, with Switzerland and Luxembourg outranking all other nations. It is followed by America, Oman, and Scandinavian countries. This is most likely due to the high wages, living standards and environmental regulations in the European Union.

Something that is surprising was how poorly some European countries performed, like Austria, Germany and Belgium, which are all regarded as rich European nations. There seems to be a direct correlation with the top 3 countries in where they all greatly outperform the other nations in the economic potential to raise the country's ranking in the index.

Past the first three countries there does not seem to be a direct correlation between the rest of the nations with some being extremely average and scoring well while others excell at one sub indece to increase their ranking this is to be expected for example the middle east will have bad environmental due to the countries drilling for gas and oil.

While some European nations have weak economic potential due to how expensive it is to live in the countries compared to the salaries they are earning.

Switzerland seems to be the golden standard, with countries gradually ranking lower the further east you go from Switzerland, apart from the USA.

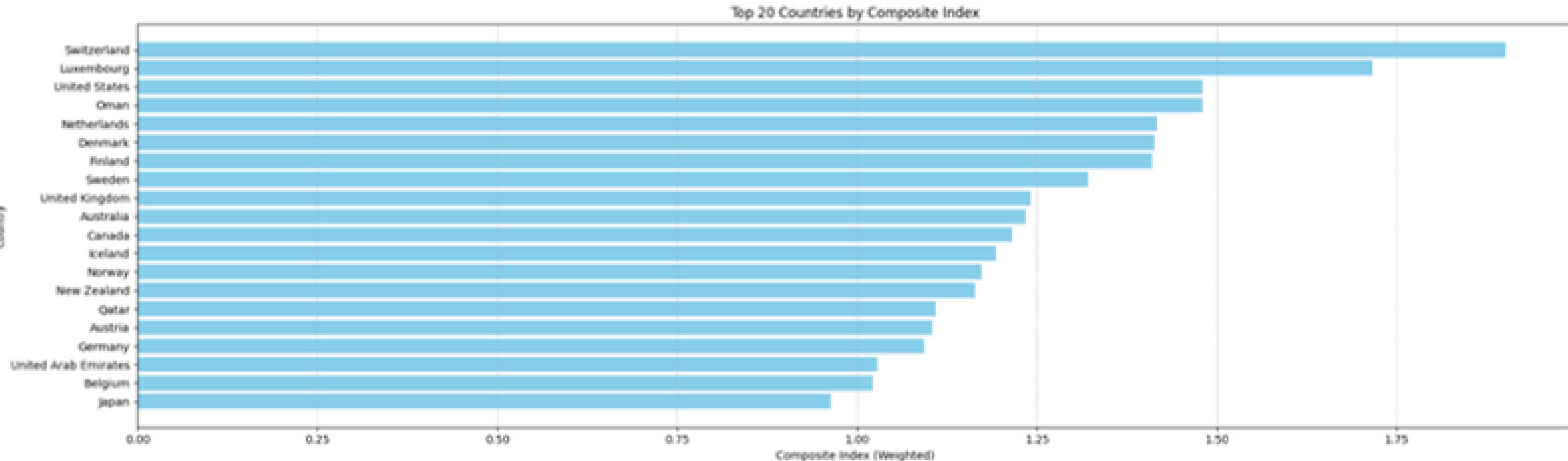
The complete results of the index show how each country performs in the composite index, including a graph on how the country compares to the average and the maximums of the other top 20 countries in the index of the best country to move to as a software developer.



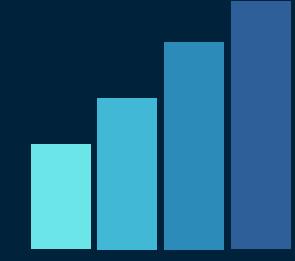
The results



Below are the results of the composite index, which compares multiple countries based on key indicators like economic, environmental and general living standards. Switzerland and Luxembourg clearly outperform the other nations as the best countries to move to as a software developer. They ranked so high due to Switzerland's huge economic potential and Luxembourg's overall above-average performance in all of the subindices. The remaining countries are grouped into clusters like the Scandinavian nations and some central European nations. This grouping is expected as countries in a similar geographic location are more likely to be similar, especially in the features we looked at like economic and living standards.

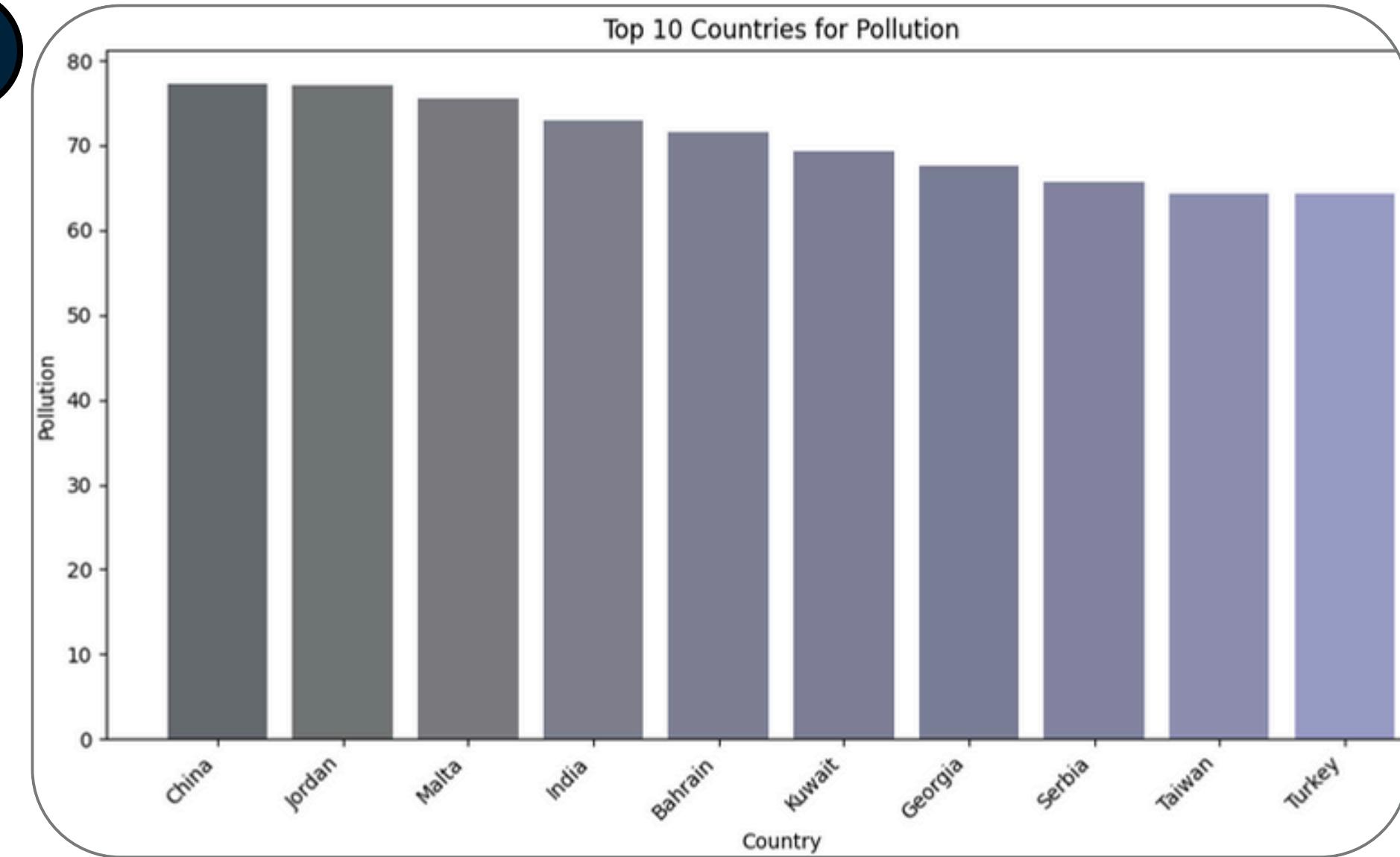
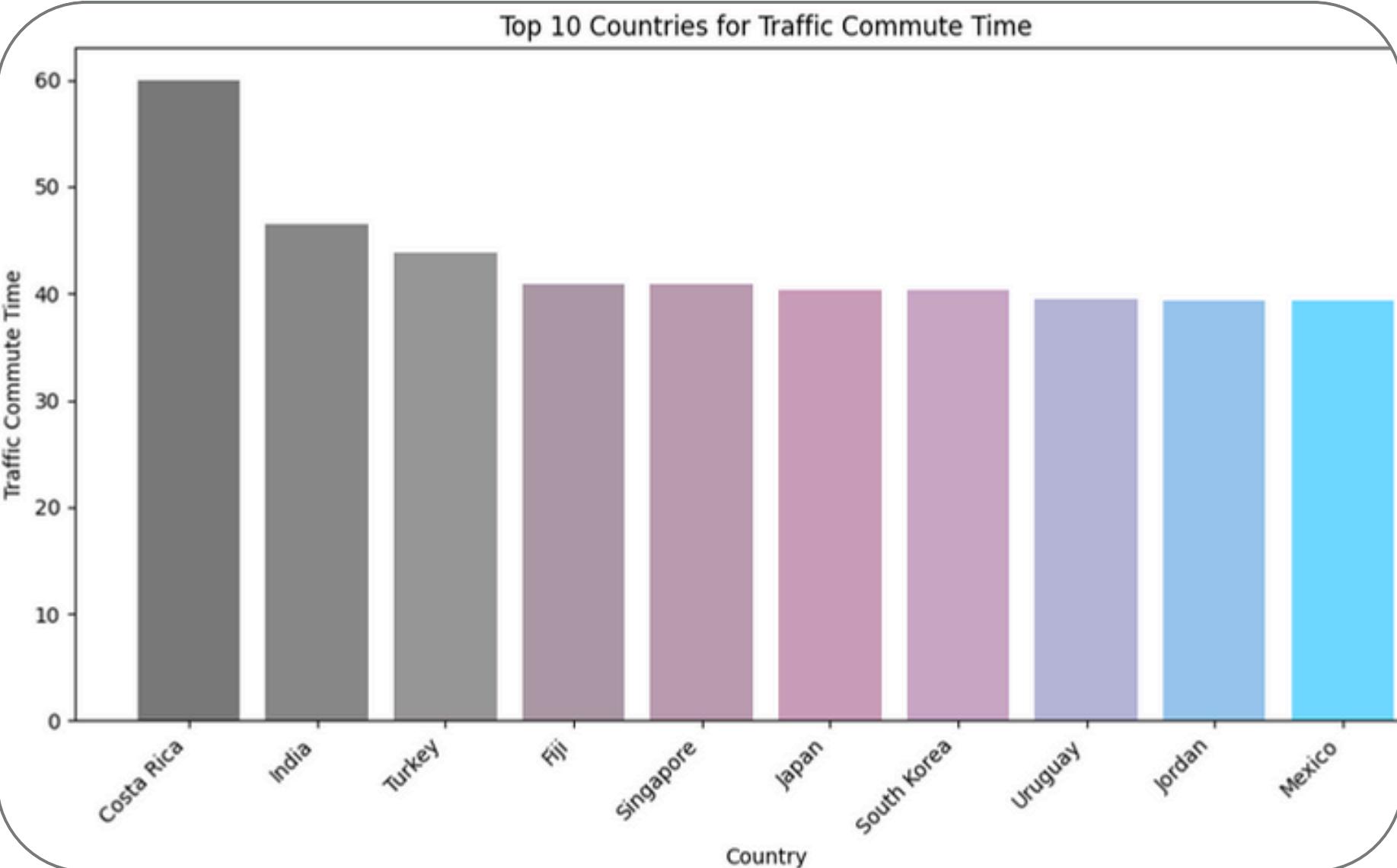


Other Comparisons



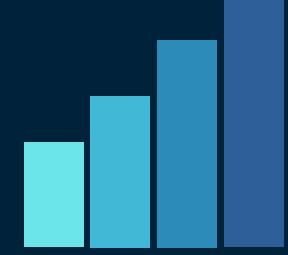
These are some of the original features, some of which got cut out of the final composite index due to multicollinearity

Below is a comparison of the top 10 with the worst commute times. Most countries are here due to them having cities with very large populations, the others are due to poor infrastructure

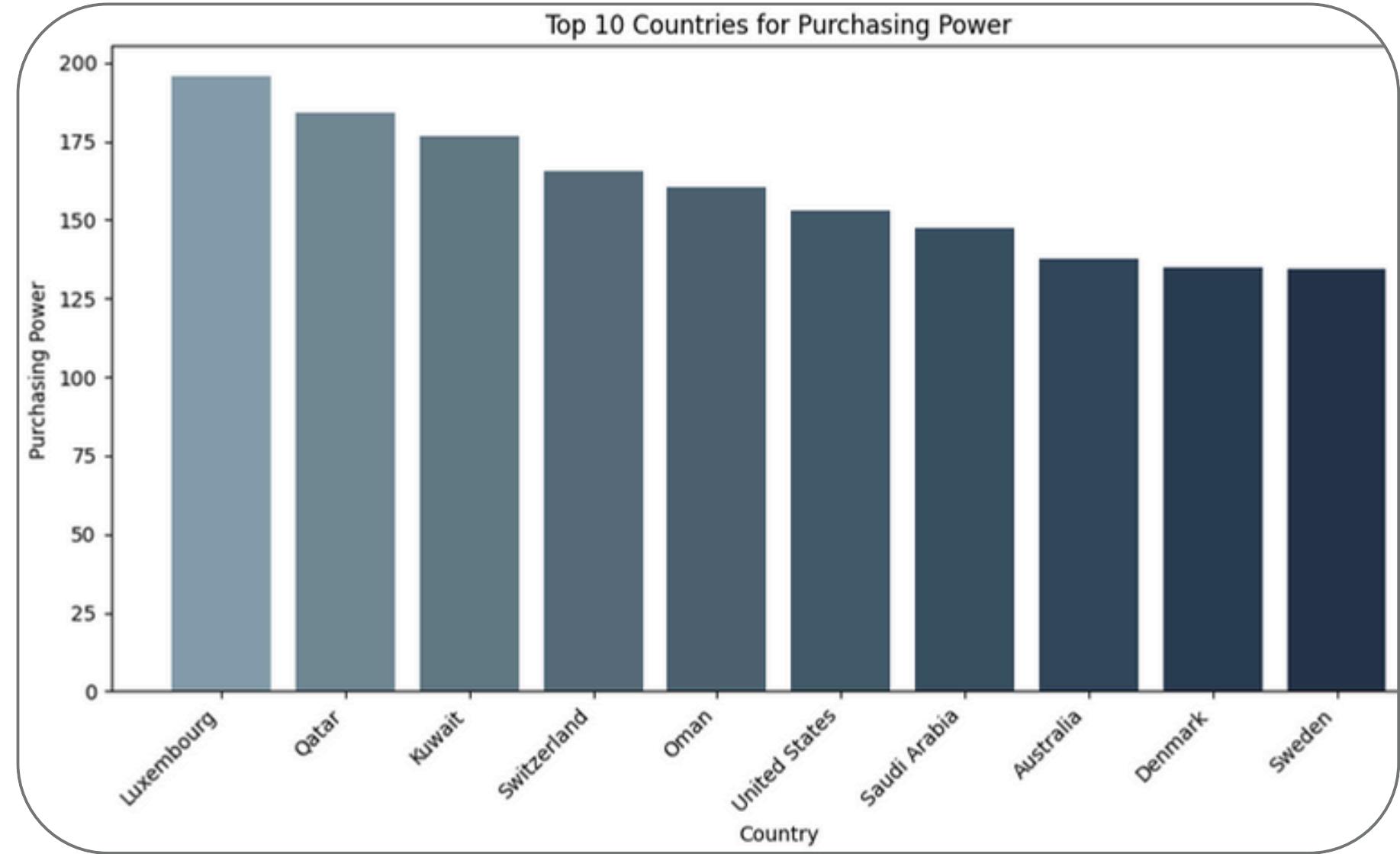
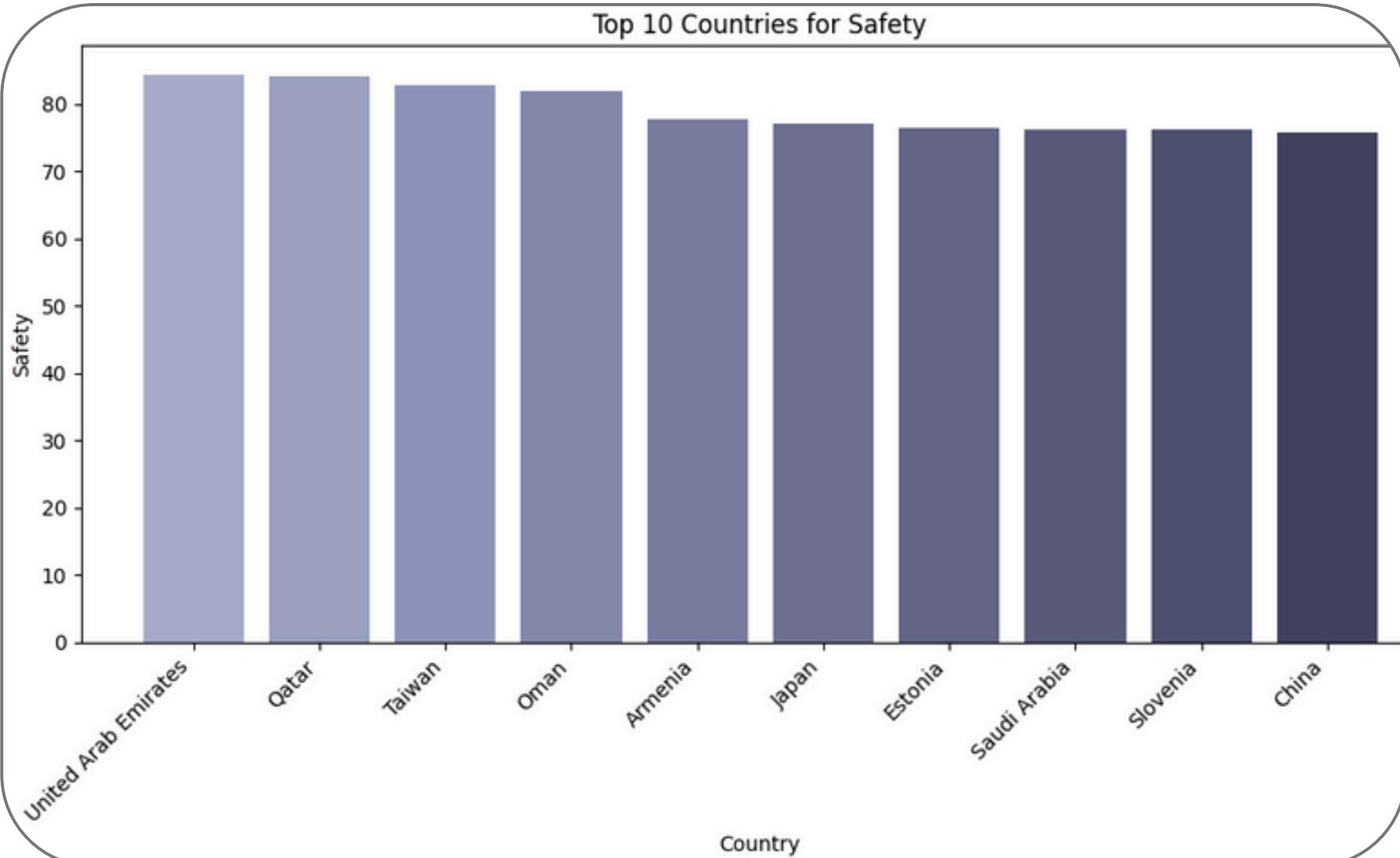


The countries above are the worst for pollution. They rank so high due to either being an industrial country or not having many regulations to do with pollution control

Other Comparisons

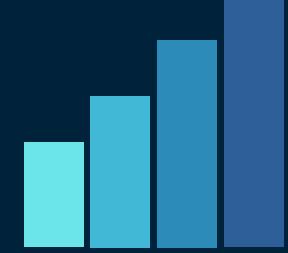


Below is a comparison of the top 10 safest countries. The safest countries in the world were the ones in the Middle East where there is little to no tolerance to crime

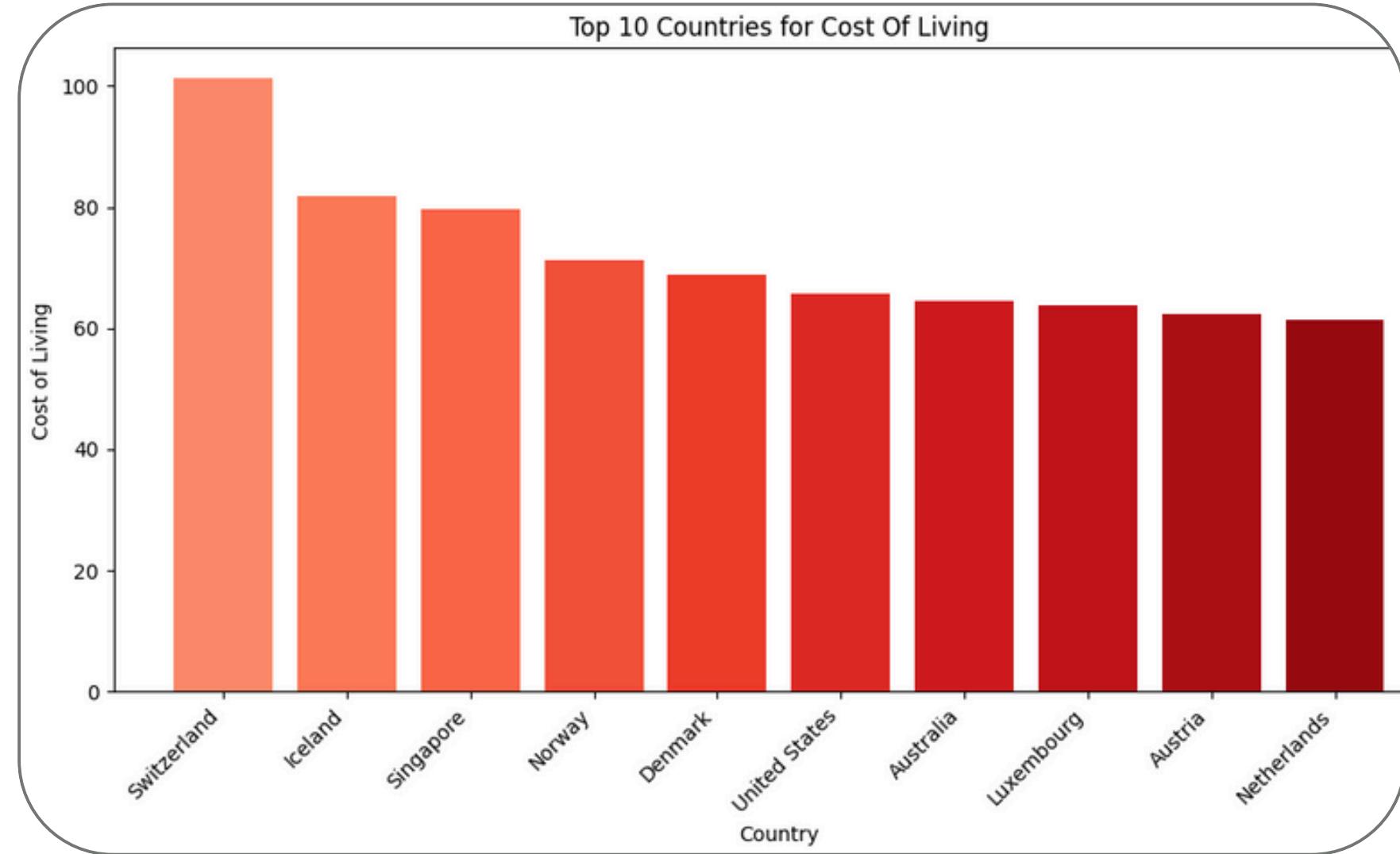
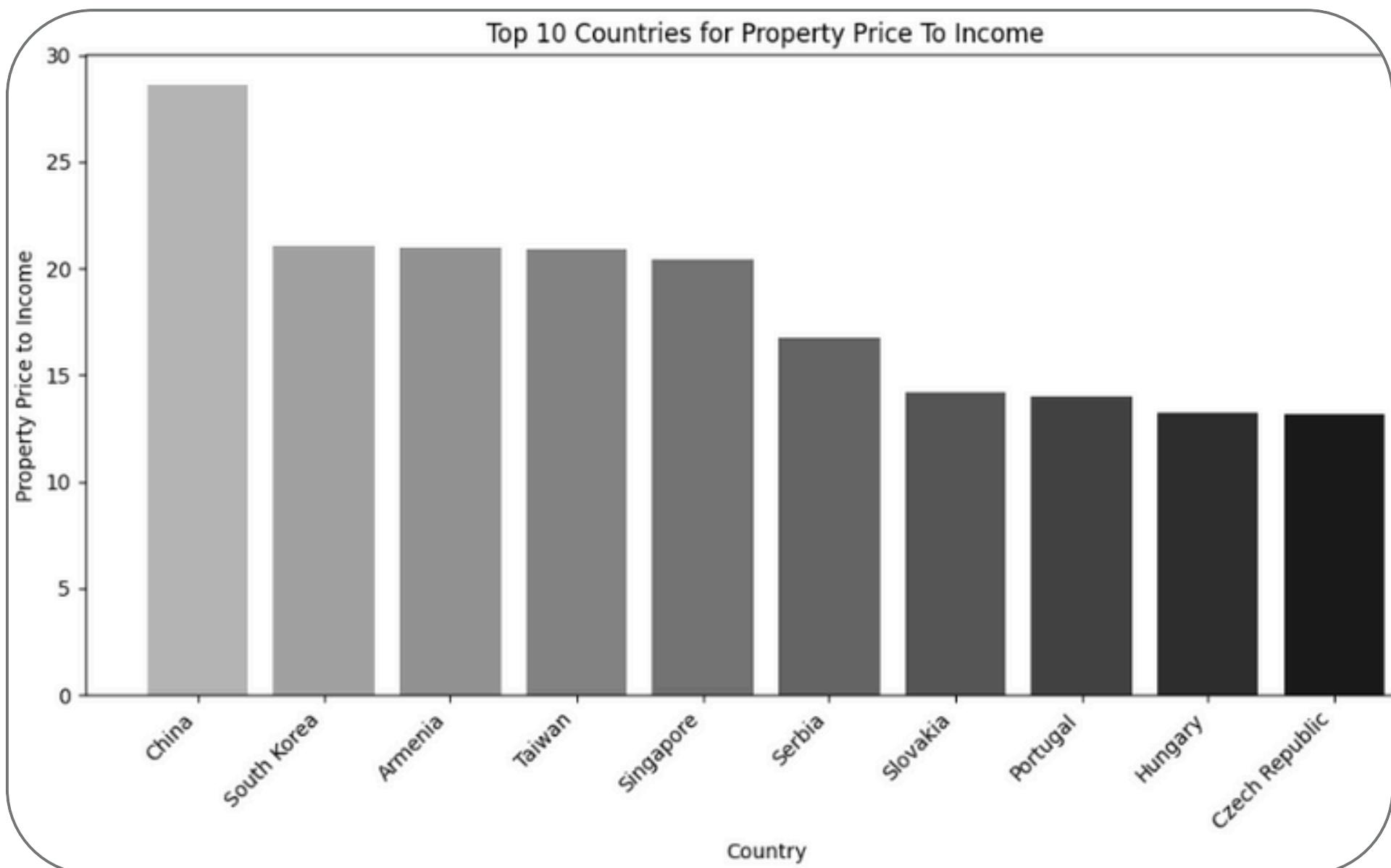


The top 10 countries are listed above are the top countries that performed well in economic potential

Other Comparisons

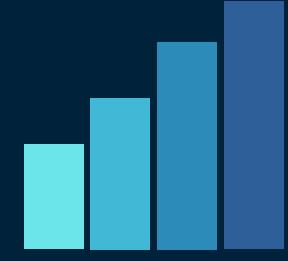


Below is a comparison of the top 10 countries when comparing the countries income to the price of property the high the country is in the chart the better of a property you will be able to afford .

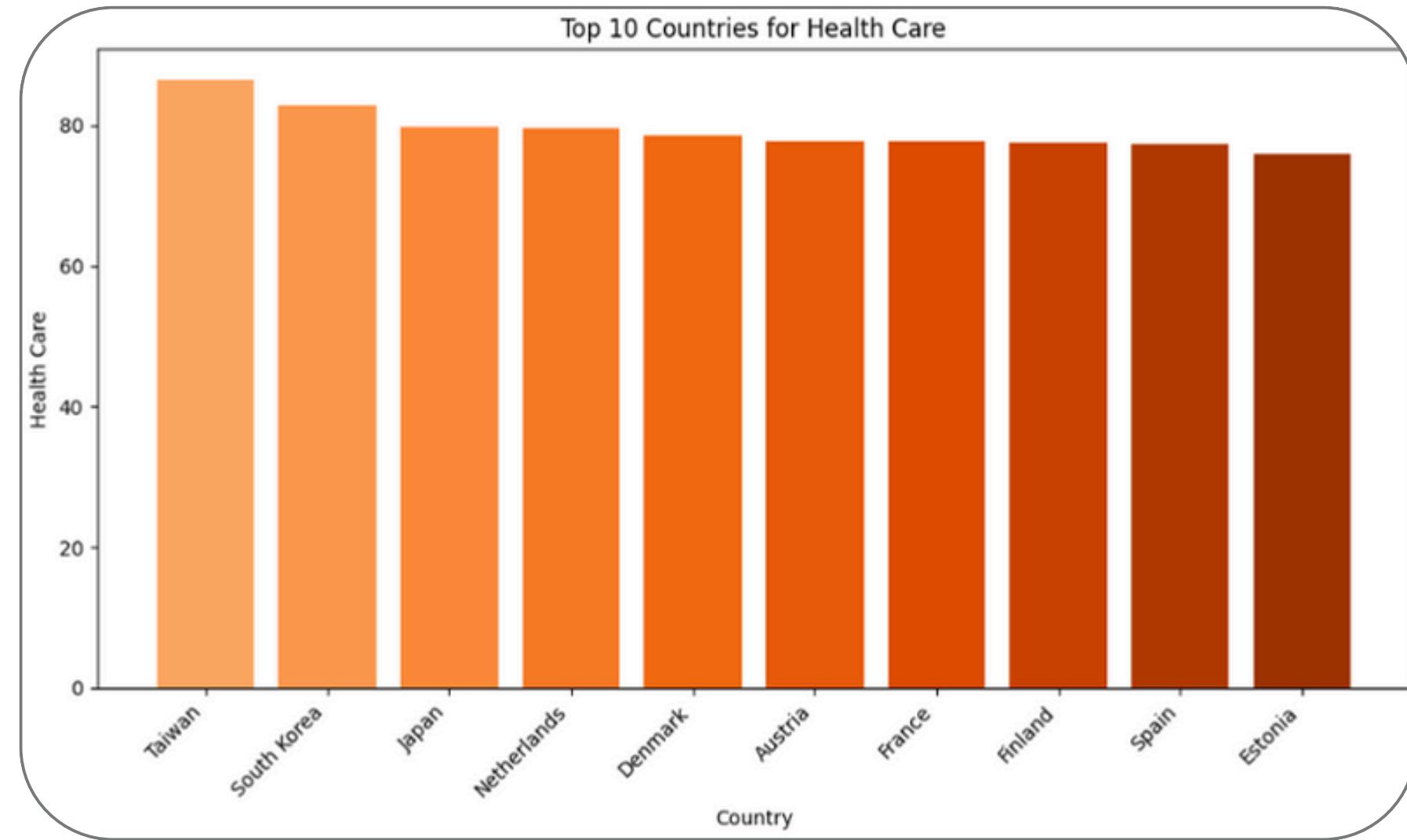
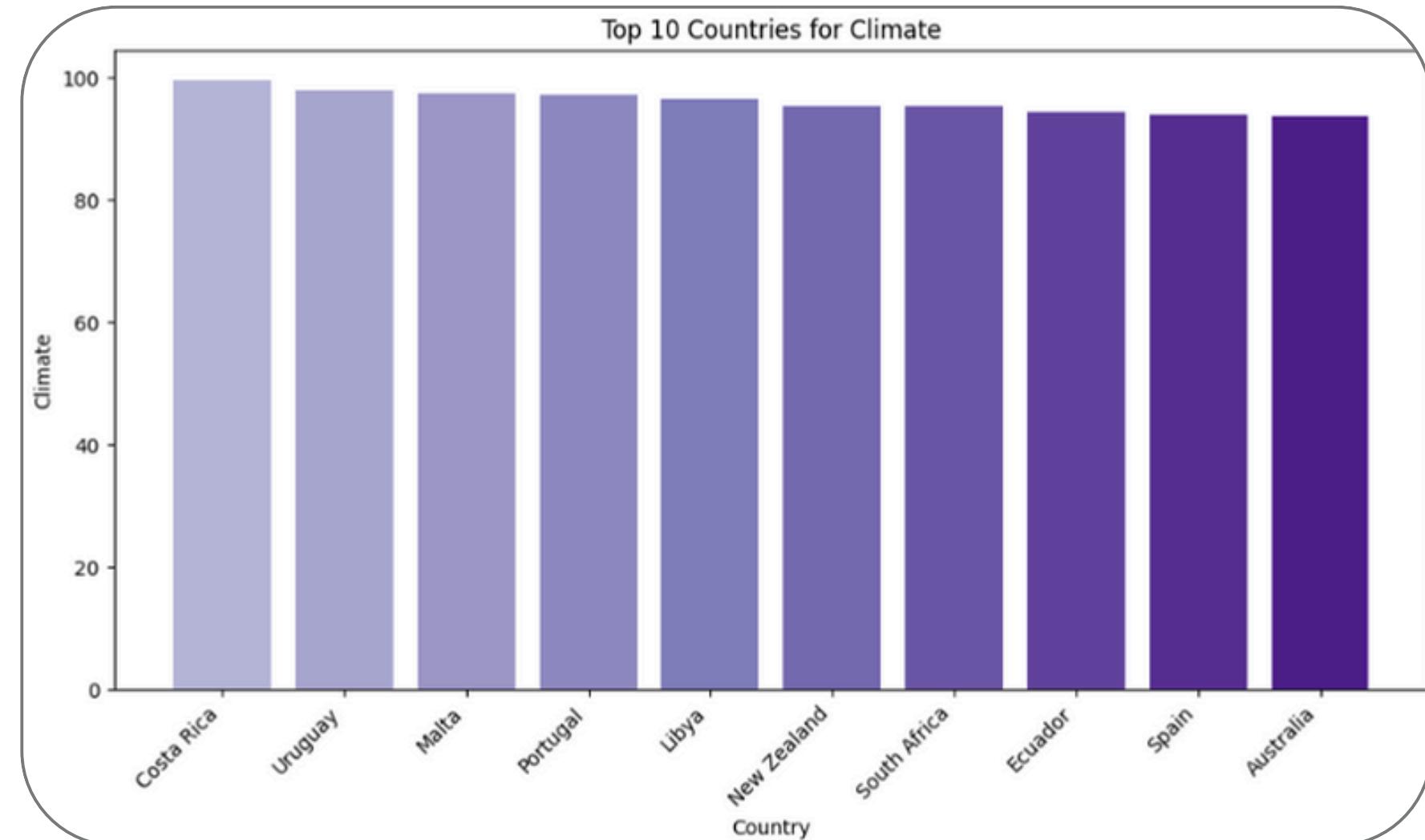


Above are the top 10 countries that are the most expensive the live in. Switzerland with is known as the most expensive country in the world tops this list.

Other Comparisons



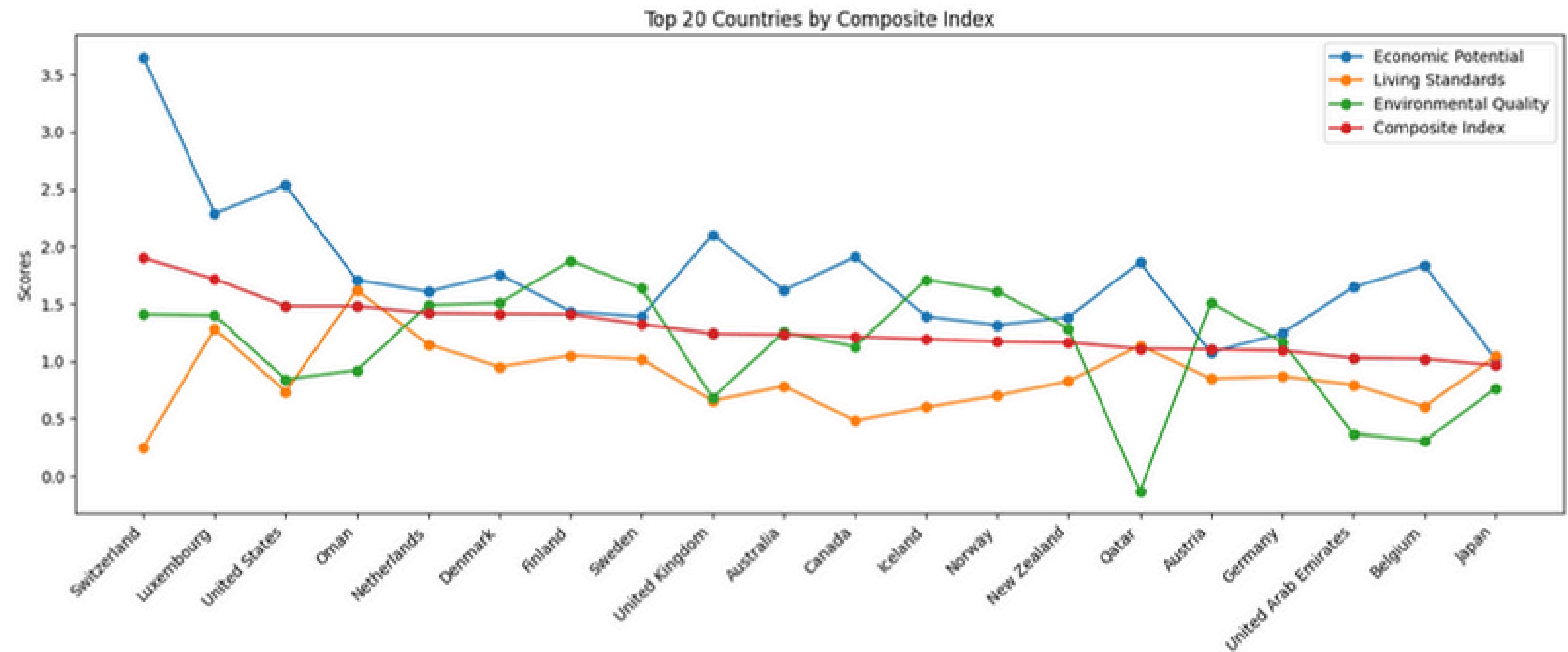
Below are the countries with the best climate according to the dataset all the counties having warm weather all year round



Above are the countries that have the best health care in the world . All of which being the in the developed first world countries.

Composite index Graph

Here we see how the countries in order compare to each other in the composite index and all of the sub-indices. You can clearly see which countries outperform others and why they are ranked above others. You can also clearly see the min and max of the top 20 countries indecies

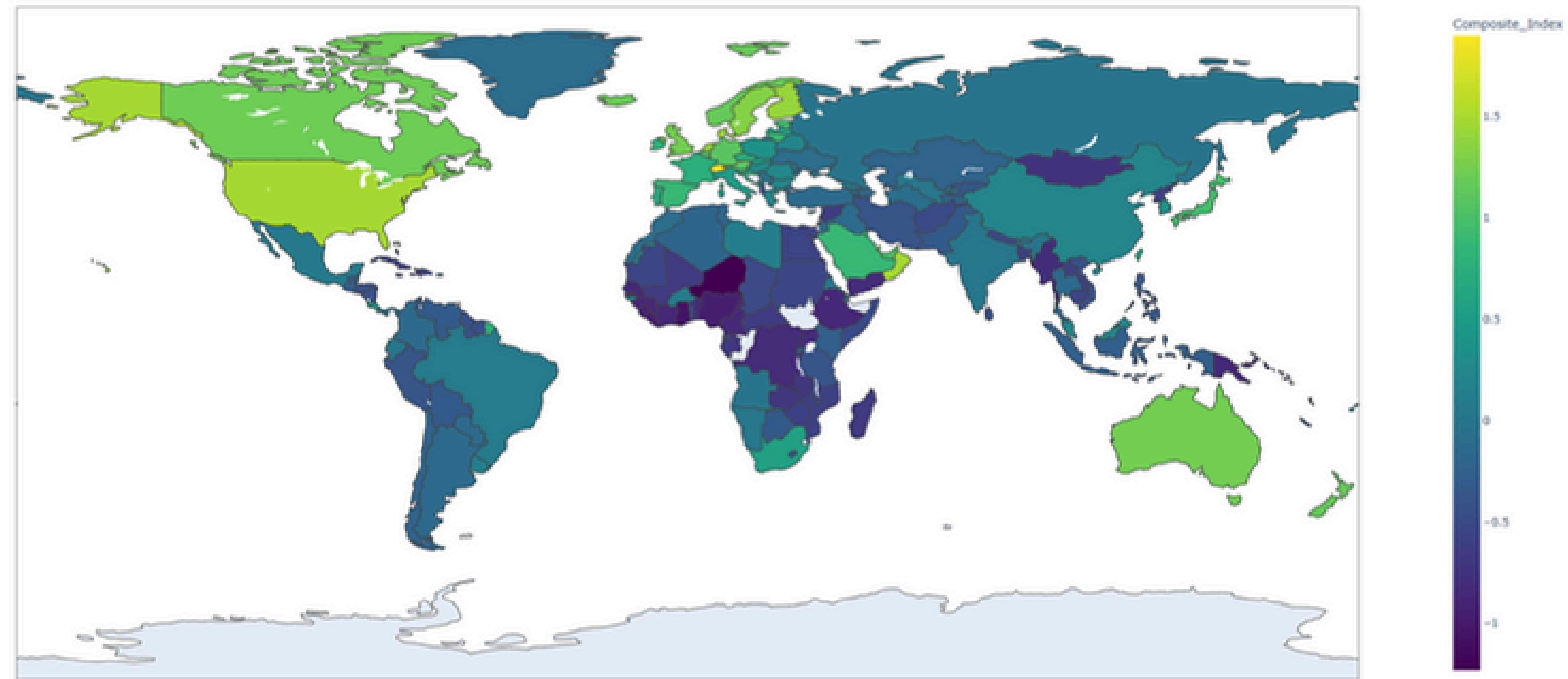


Global Map

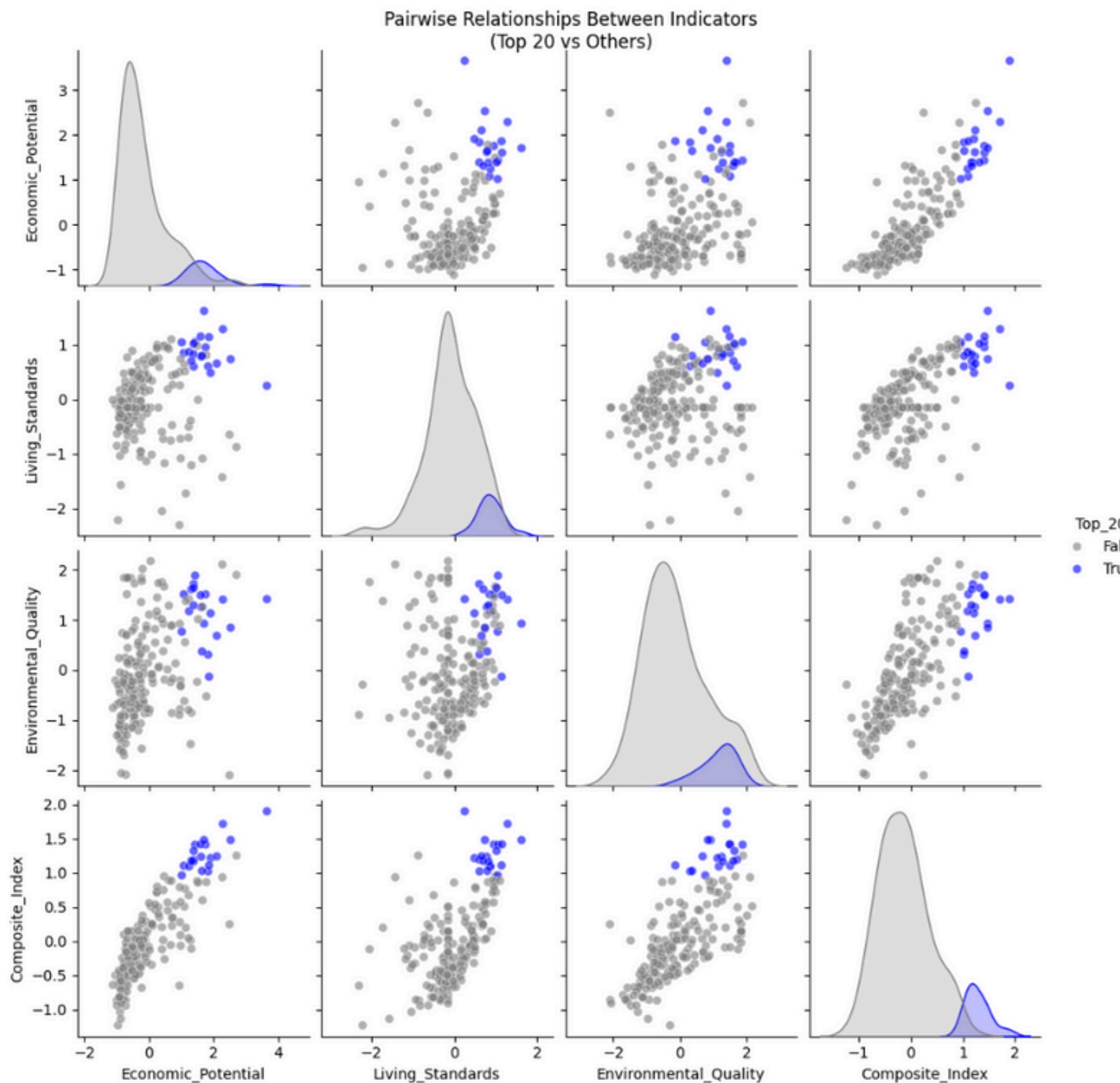
Here is the global map colour-coded to reflect how well each country did in the composite index.

The countries that performed better are closer to yellow and gradually go down to a dark purple, the worse they performed. This helps visually compare countries across the different regions and continents.

Global Distribution of Composite Index



Top 20 Comparison

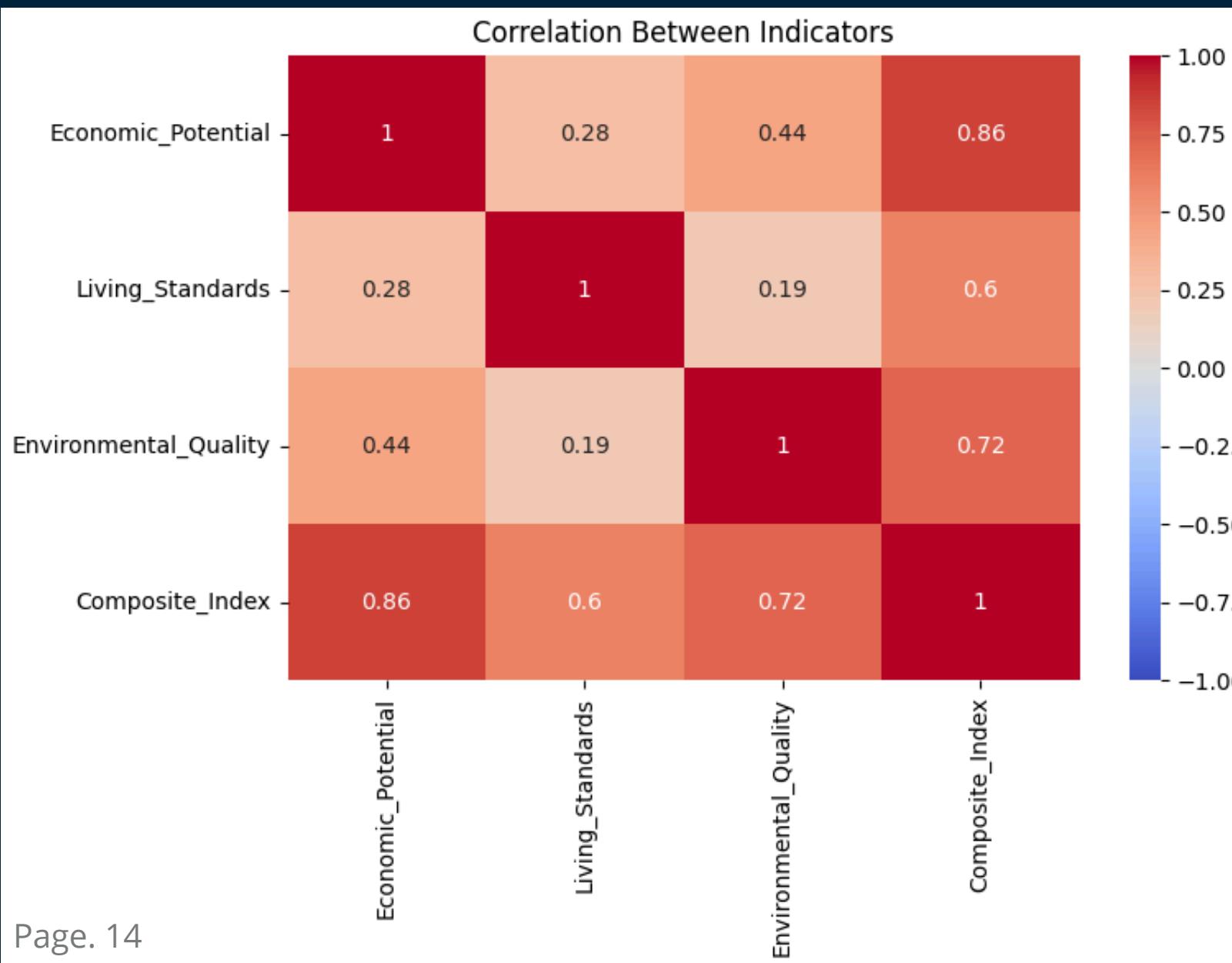


This graph shows how the 20 countries from the composite index compare to all other nations globally, indicated by the blue representing one of the top 20 nations from the composite index. Visualising using both scatter plots and Venn diagrams.

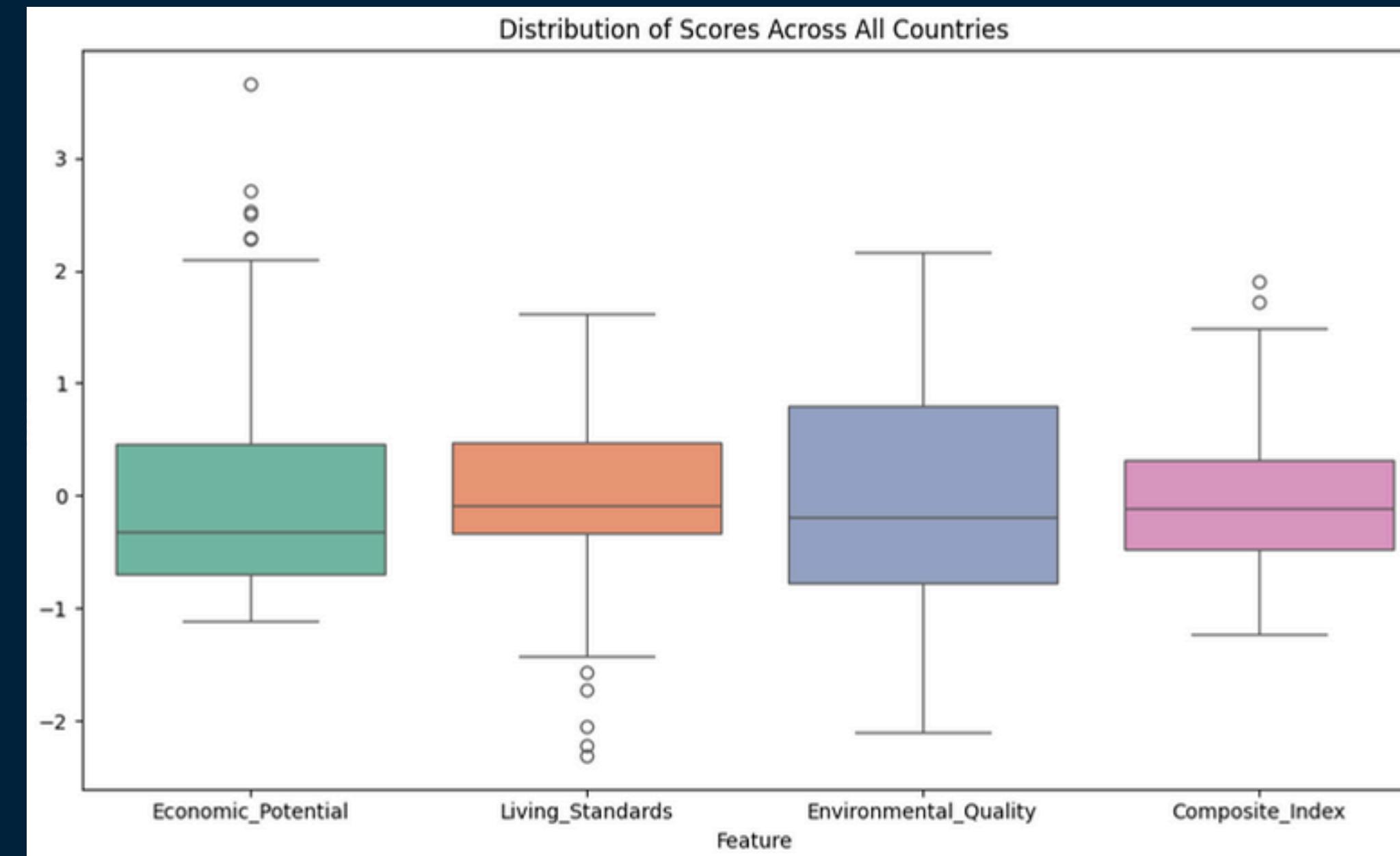
By looking at his graph, we can see why these nations were in the top 20, as in almost every graph they are in the upper quartile, indicating the same countries consistently scored high in the sub indices.

Sub indecies Graphs

This graph is the heatmap correlation graph that compares how similar an index is to another. The closer the value is to 1, the stronger the correlation .As we can see there are no negative correlations on the graph



This graph is a box plot distribution of the scores for the top 20 countries. From this graph, you can see the minimum , maximum , lower , upper quartiles , median , interquartile range and also the outliers . You can see some of the countries that performed very well in the composite index, due to them being extreme outlier,s especially if you look at the economic potential with the top one being Switzerland



Analysis of country trends



At the very start of this composite index creation, I predicted Switzerland to be in first, with Canada in second and the United States in third. This came from reading multiple lists of the best countries to move to as a software engineer. With an honourable mention to the United Kingdom, Germany, and Australia.

When prompted to chatGPT it predicted Germany, Canada and the USA. After conducting this research, cleaning the data, and weighting the sub-index, I got the final results from my dataset, which were somewhat of what I had originally predicted.

Switzerland performed the best overall due to the economic potential of the country being so great that it placed the country number one. Luxembourg came second, and the United States came third. Which was surprising but not unexpected. What was surprising was how some countries performed a lot worse than I had originally thought.

For example, Canada ranked 11th overall while Germany placed 17th. The economic potential and living standards were below average for these countries, respectively, which dramatically brought their rankings down.

As expected, we had some countries that we expect to be in any top country list, like the Scandinavian countries, some other central European nations, Japan and the Middle East. Along with Australia and New Zealand. But it is interesting to see where some countries really suffered and prevented them from being higher on the list.

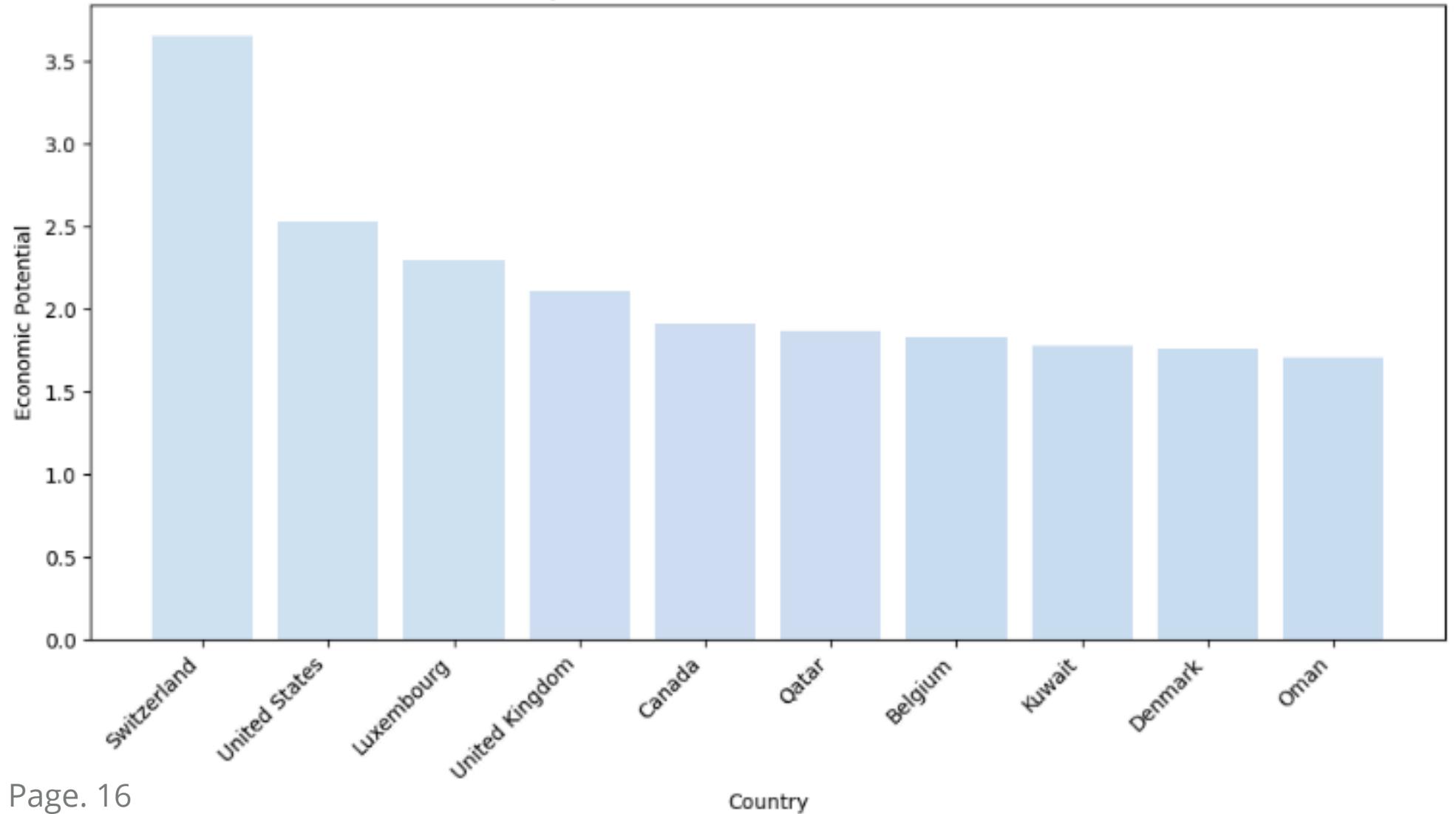
Qatar did well overall, but the environmental pollution is extremely poor, leading to a negative score, the only one in the top 20 countries. This is because of their drilling and processing of oil and natural gas, but as the nation moves away from it and becomes more green, I am certain the country will rapidly go up in the ratings as one of the top nations in the world to emigrate to as a software developer.

Economic Potential

Economic Potential is a key component of the composite index. The economic potential of a country was calculated by looking at two factors. The average salary for a software engineer in the country, and also the purchasing power which determines how much it costs for goods and services, based on that salary

This sub-index is weighted at 40% of the overall composite index. Reflecting the high importance of financial gain when choosing a country to emigrate to. The ideal country would have a high income and standard of living, as it is a top priority for many people as it gives people financial stability.

Top 10 Countries for Economic Potential

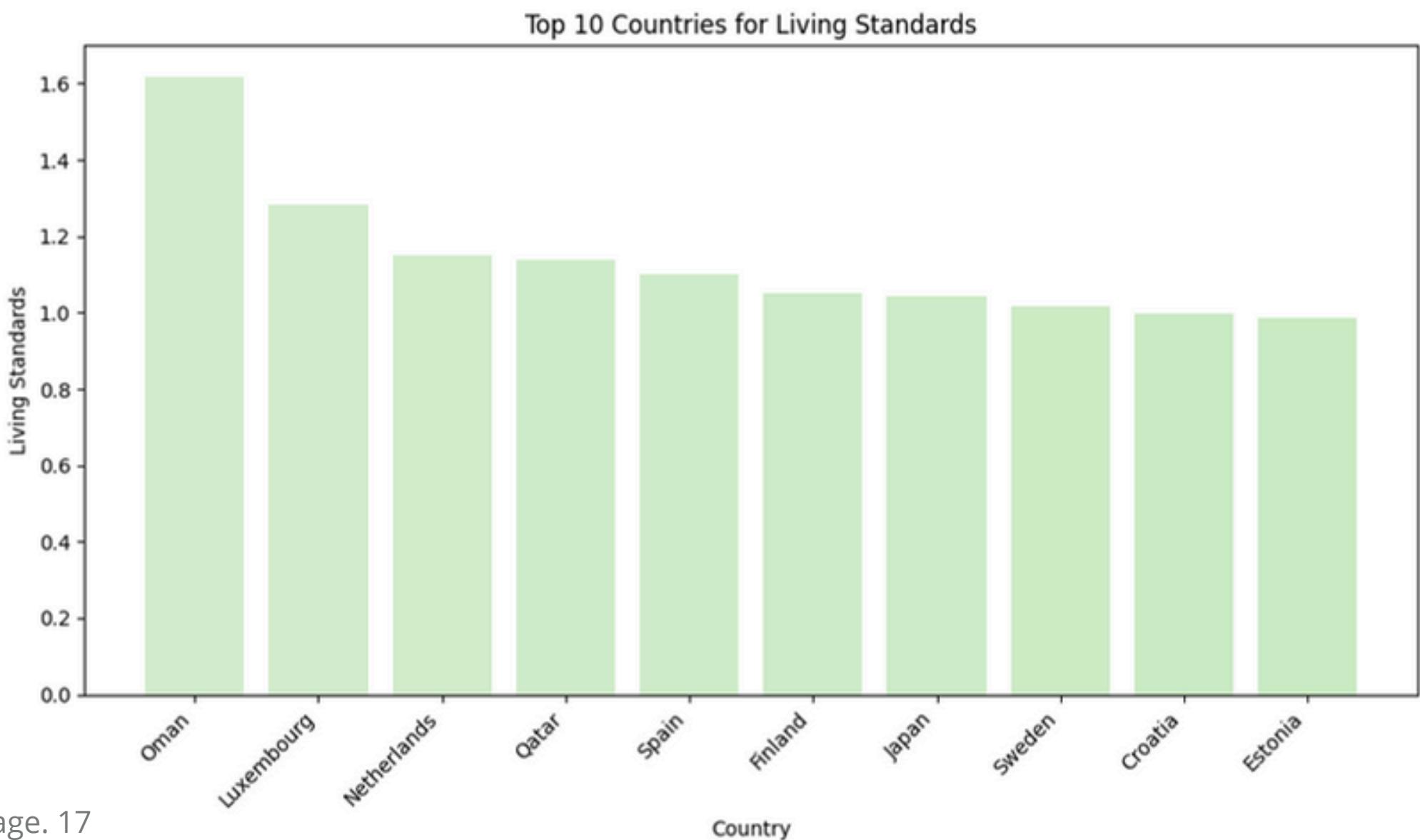


How Economic Potential was calculated and its weighting in the Composite Index

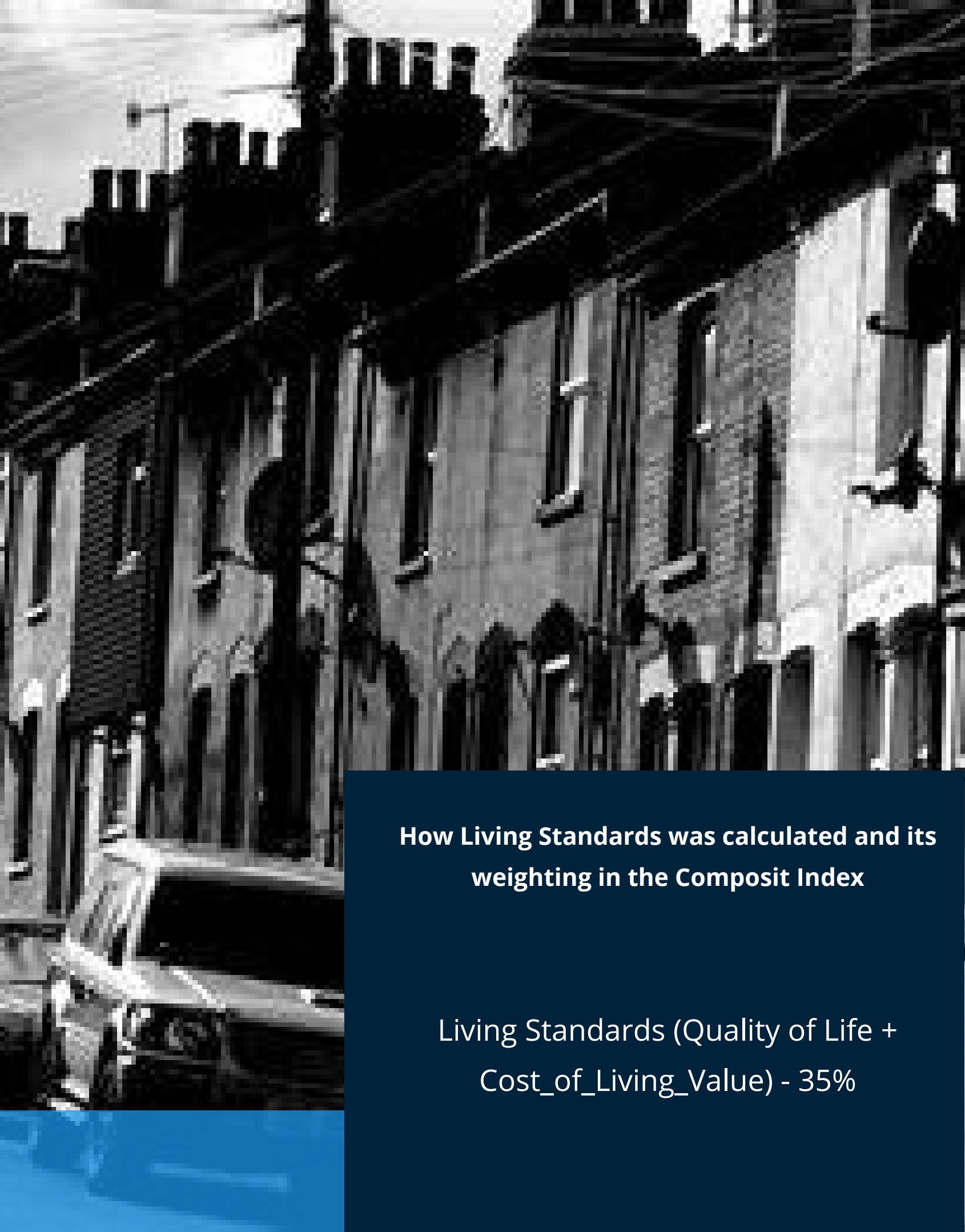
Economic Potential (Salary + Purchasing power) - 40%

Living Standards

Living standards are a critical component of the composite index . the quality of life measure how good of a life you can live in a country while the cost of living is how affordable it is from rent to groceries. This reflects the livability and financial comfort a country is able to provide .



This sub-index is weighted at 35% of the overall composite index. This reflects that the quality of life and the cost of that quality is of high importance to anyone when it comes to deciding a new country to immigrate to .



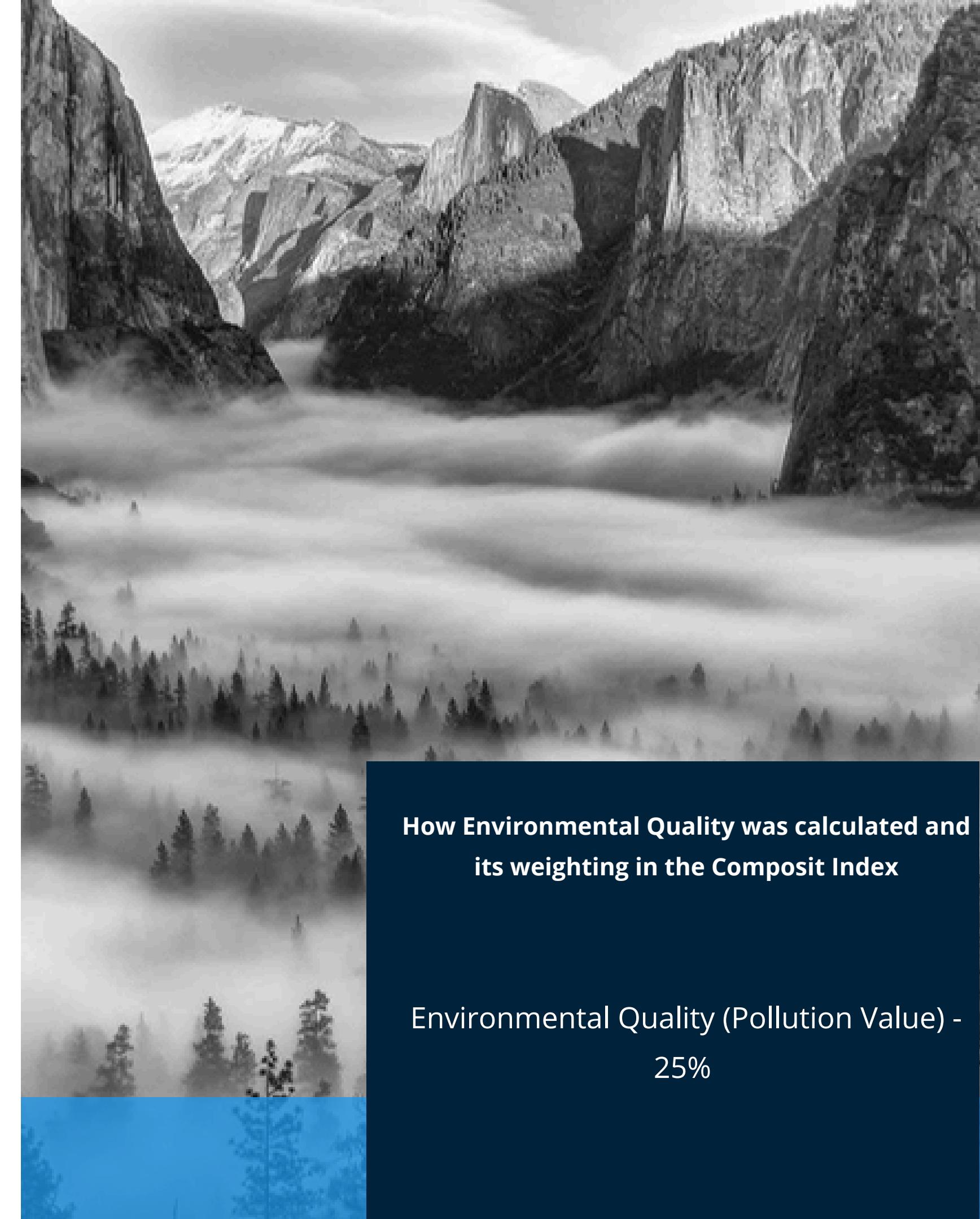
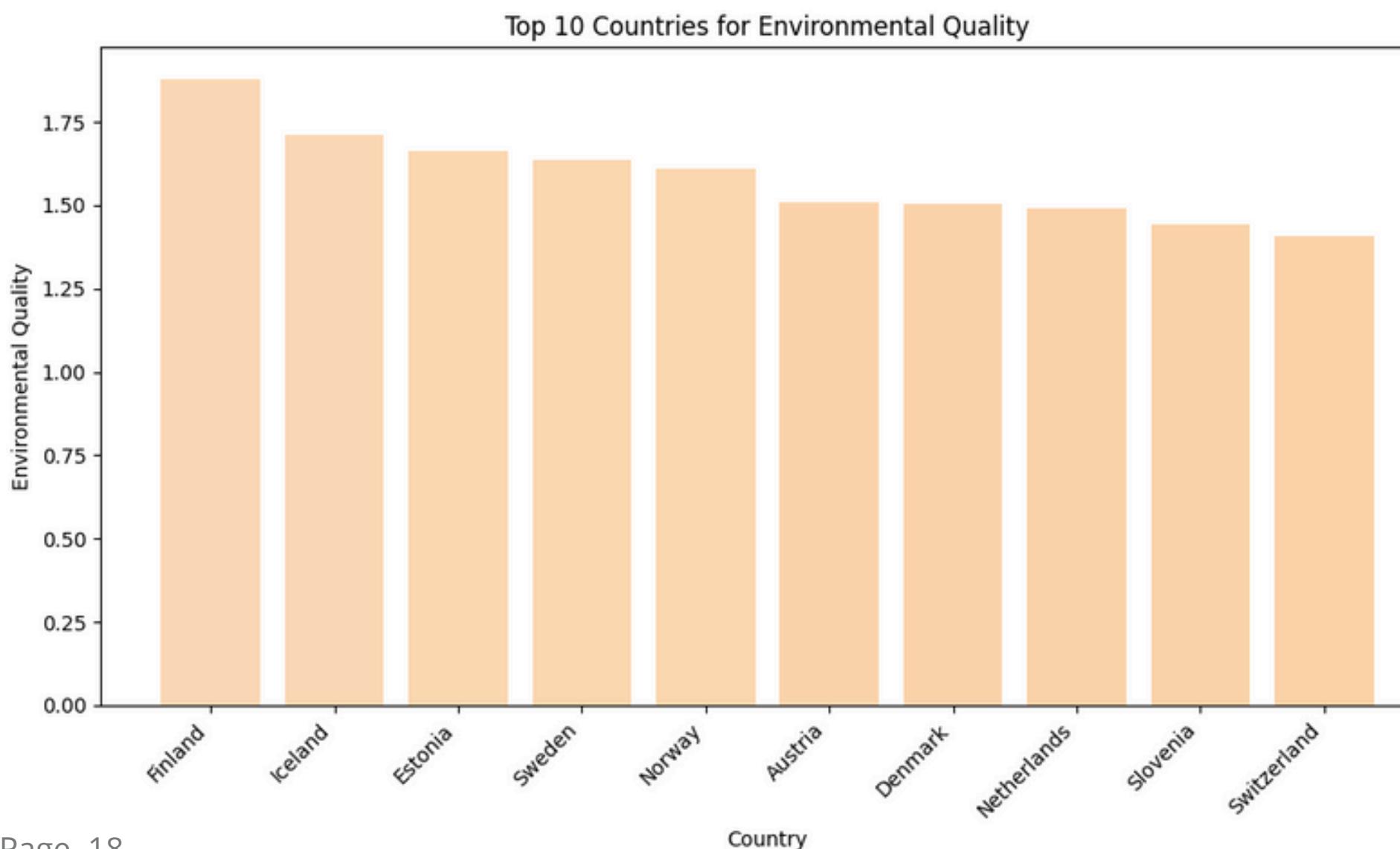
How Living Standards was calculated and its weighting in the Composit Index

Living Standards (Quality of Life + Cost_of_Living_Value) - 35%

Environmental Quality

Environmental Quality measures how clean a country is by getting the country's pollution values. Countries with lower pollution levels will typically offer a higher and healthier quality of life for their residents. This is important, especially if you are planning on moving and living in a country long term

This sub-index is weighted at 25% of the overall composite index. This reflects the importance of living in a clean country that cares about the health of the people and the environment of the country

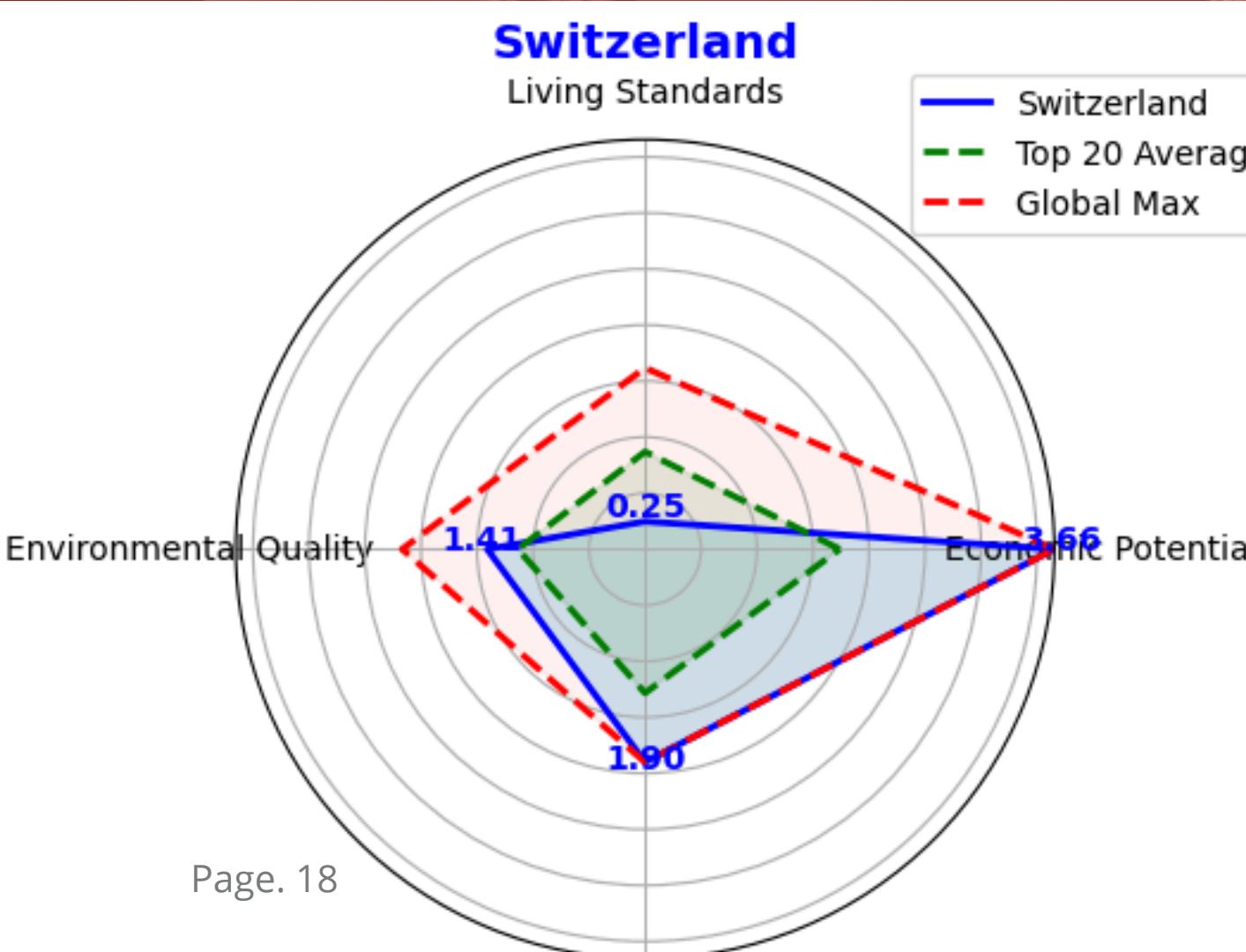


How Environmental Quality was calculated and its weighting in the Composite Index

Environmental Quality (Pollution Value) -
25%



SWITZERLAND



Composite Index

Switzerland scored a 1.90 which is ranked number one globally as the best place to move to as a software developer



Living Standards

Switzerland scored a 0.25 which is below the average and far below which is due to the data from the dataset

Environmental Quality

Switzerland scored a 1.41, which is marginally more than the average. This implies that, environmentally, Switzerland has an above average environment which is to be expected since Switzerland is known for its nature and beautiful landscape.

Economic Potential

Switzerland scored a 3.66 which is the most of any country . This is due to the very high cost of living in switzerland resulting in a extremely high salary for software developers.

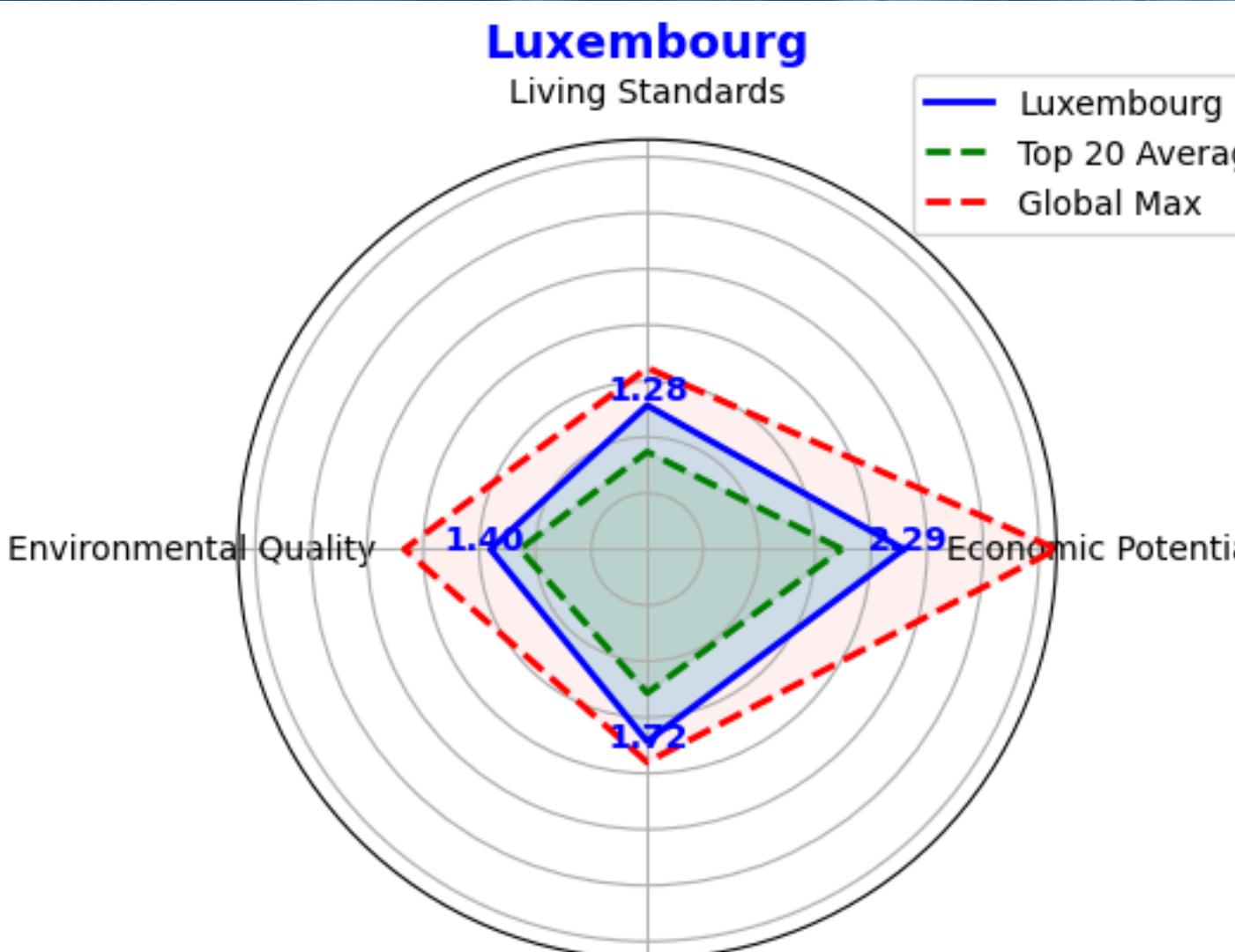
Conclusion

Switzerland ranks 1st globally overall the economic potential and environmental quality greatly overpowers the negative effects of the low living standards.

Composite Index

Luxembourg scored a 1.72 on the composite index, ranking it second globally

LUXEMBOURG



Living Standards

Luxembourg scored a 1.28, which is above average and is close to the global maximum, reflecting the excellent infrastructure of the country

Environmental Quality

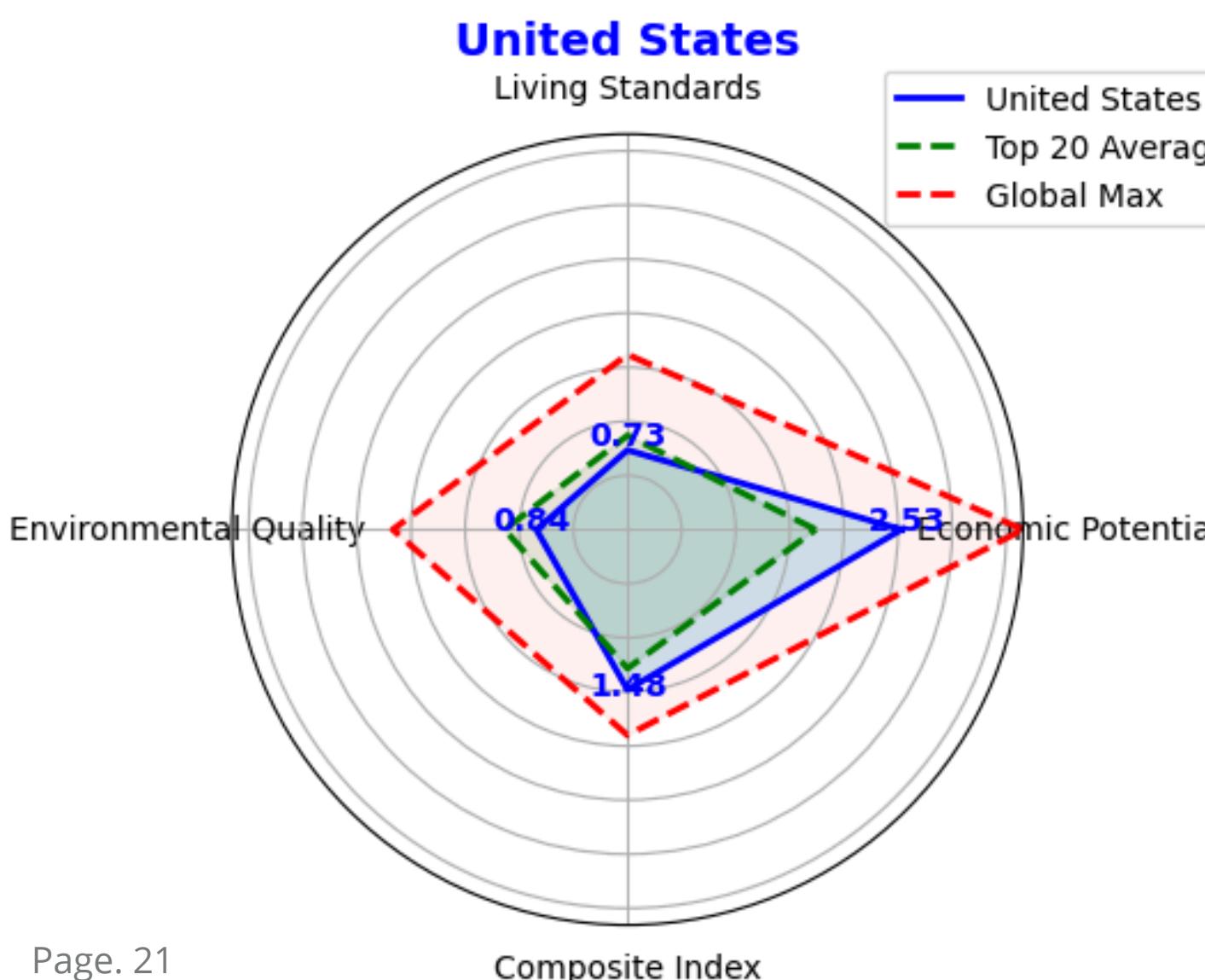
Luxembourg scored a 1.40, which is above the average and is between the average and the global max, indicating a above average environment

Economic Potential

Luxembourg scored a 2.29 which is above average but is below the maximum which would indicate the economy is good but not substantial

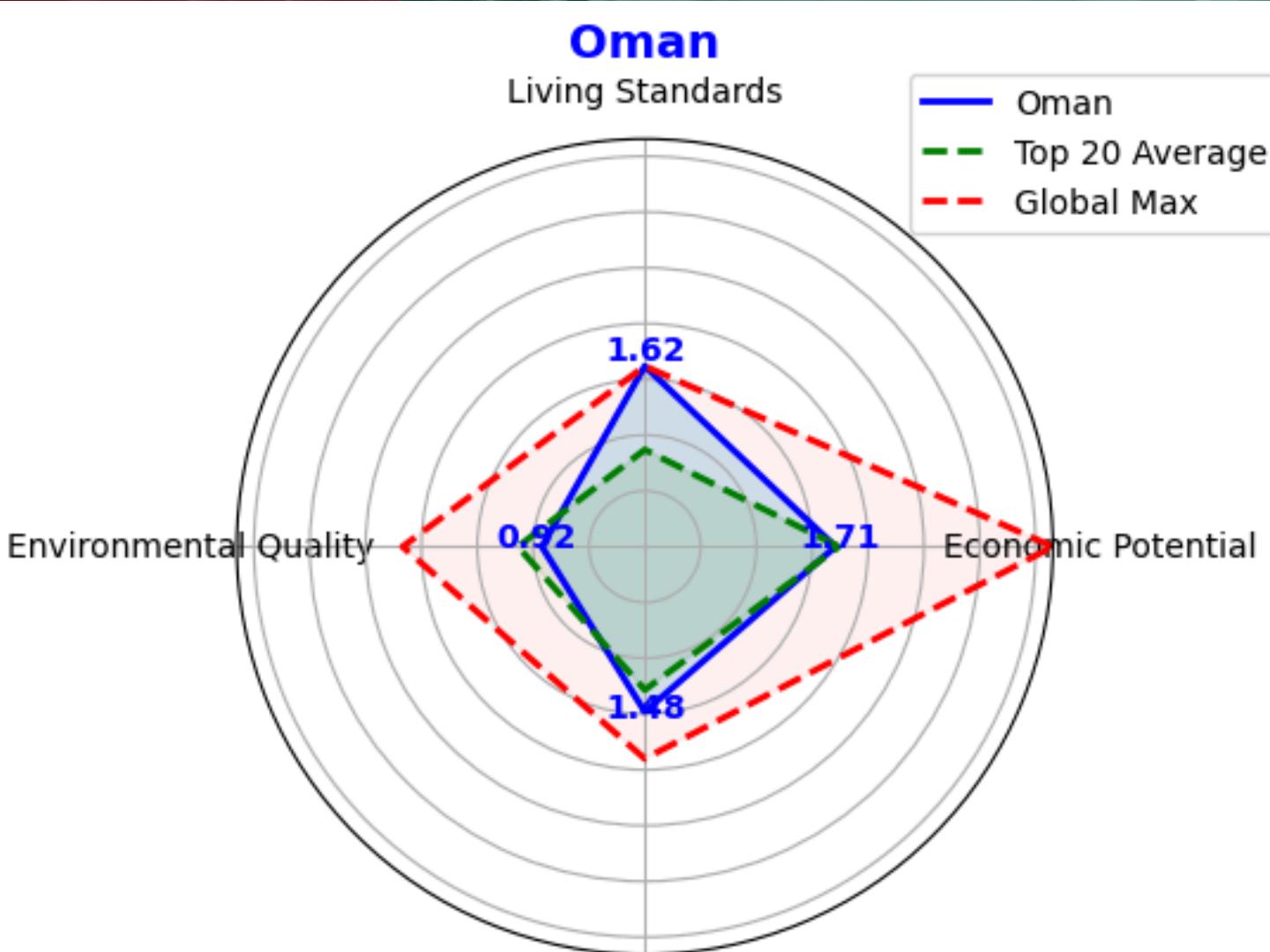
Conclusion

Luxembourg ranks 2nd globally, performing above average in all of the subindexes. Overall, It is a very balanced country





OMAN



Composite Index

Oman scored a 1.48 on the composite index, ranking it tied third globally



Living Standards

Oman scored a 1.62 which is ranked number one in the world . This reflects the exceptional quality of life and overall well-being the country offers.

Environmental Quality

Oman scored a 0.92 is marginally below the average which indicating a consideration for the environment but is just short of the average.

Economic Potential

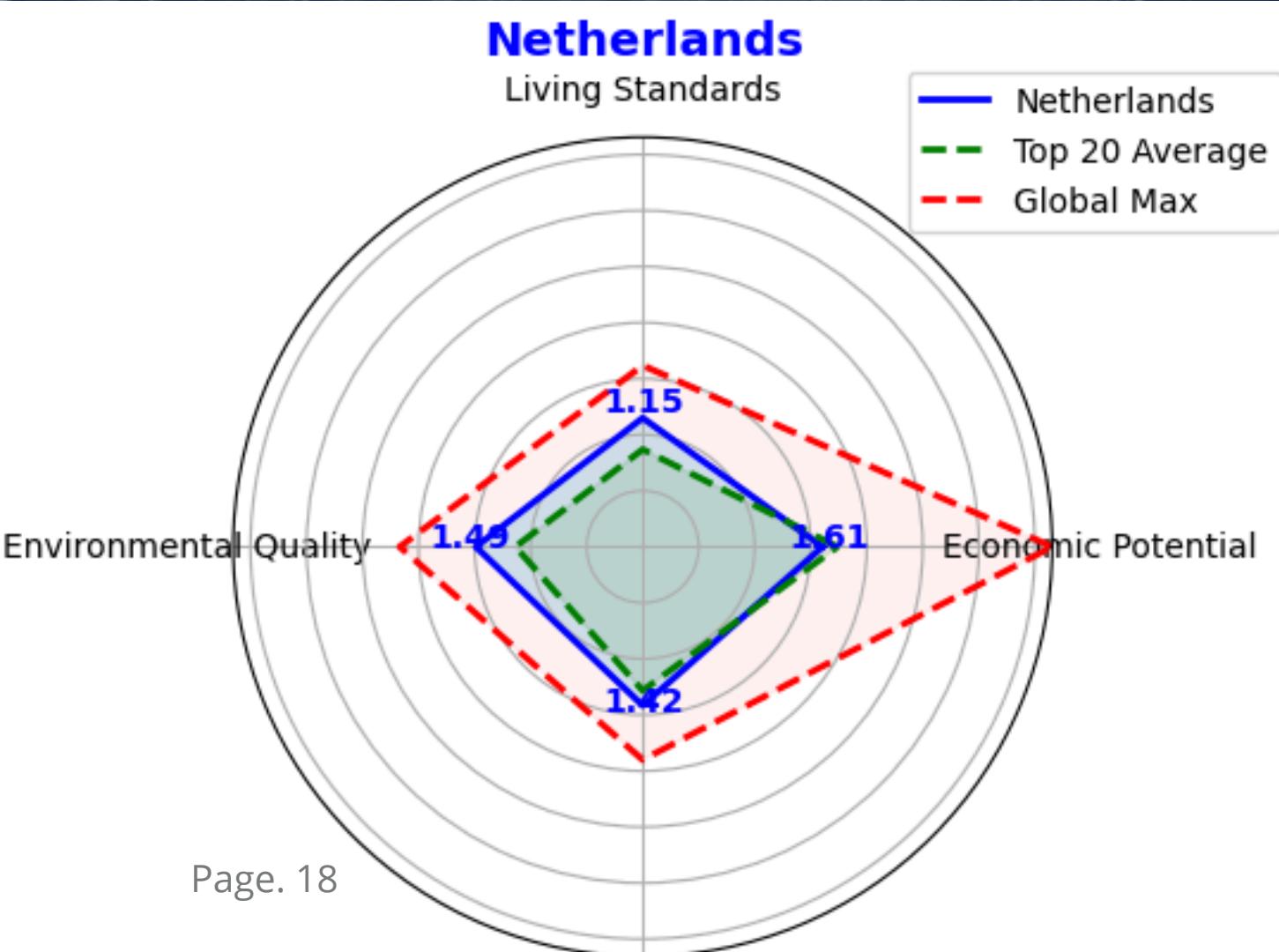
Oman scored a 1.71 is on the average line which is a indication of a stable economy

Conclusion

Oman ranks 4th globally overall. While it leads in living standards, the country is average or just below average on the other two sub-indices, showing that soon, this country could rise up the ranks.



NETHERLANDS



Composite Index

Netherlands scored a 1.42 on the composite index, ranking it 4th globally



Living Standards

Netherlands scored a 1.15 which is above the average and just below the midway to the global maximum indicating a excellent quality of life in the country

Environmental Quality

Netherlands scored a 1.45, which is above the average and midway to the maximum. showing the importance of the environment in the Netherlands.

Economic Potential

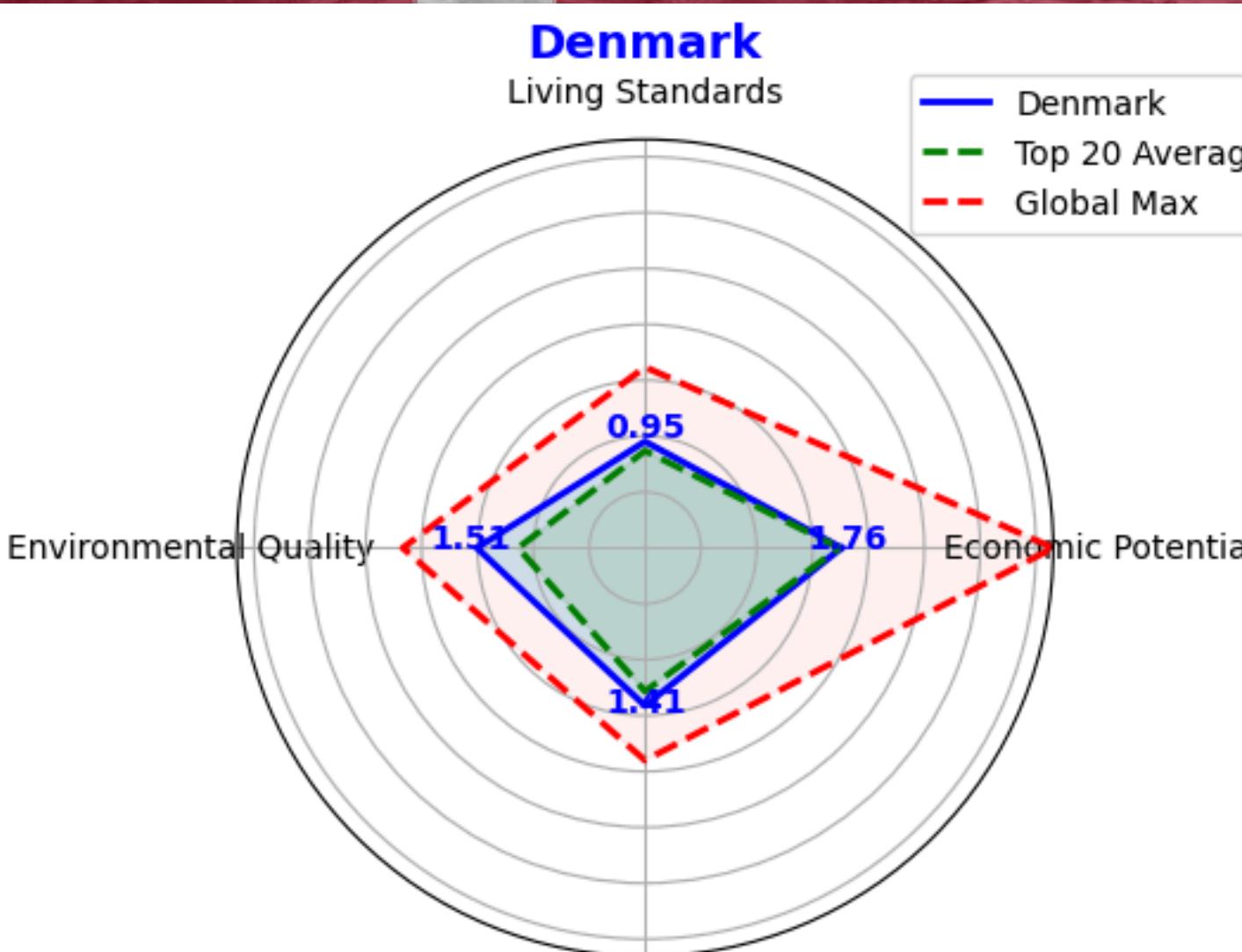
Netherlands scored a 1.61 is just below the average reflecting a strong economy but there is room for improvements.

Conclusion

Netherlands ranks 5th globally overall. It is a very balanced country overall, with the only figure bringing the index down slightly is the marginally below average economic potential



DENMARK



Composite Index

Denmark scored a 1.41 on the composite index, ranking it tied 5th globally



Living Standards

Denmark scored a 0.95 marginally over the average. This indicates a good living standard overall.

Environmental Quality

Denmark scored a 1.51 is between the average the the global maximum. This shows that the environment is important to the country of Denmark

Economic Potential

Denmark scored a 1.76 sits right on the average, reflecting a good economy but it is not a very powerful economy

Conclusion

Denmark ranks 6th globally overall. The country is very balanced but at the same time is very average and does not excel in any sub indece in perteicular

FINLAND



Composite Index

Finland scored a 1.41 on the composite index, ranking it tied 5th globally



Living Standards

Finland scored a 1.05 is marginally above average indicating a above average standard of living in Finland .

Environmental Quality

Finland scored a 1.88 is well above the average and is very close to the global maximum . This indicates that when it comes to the environment Finland is one of the best countries in the world.

Economic Potential

Finland scored a 1.43 is below average . Indicating a limited economic potential especially when compared to other European countries

Conclusion

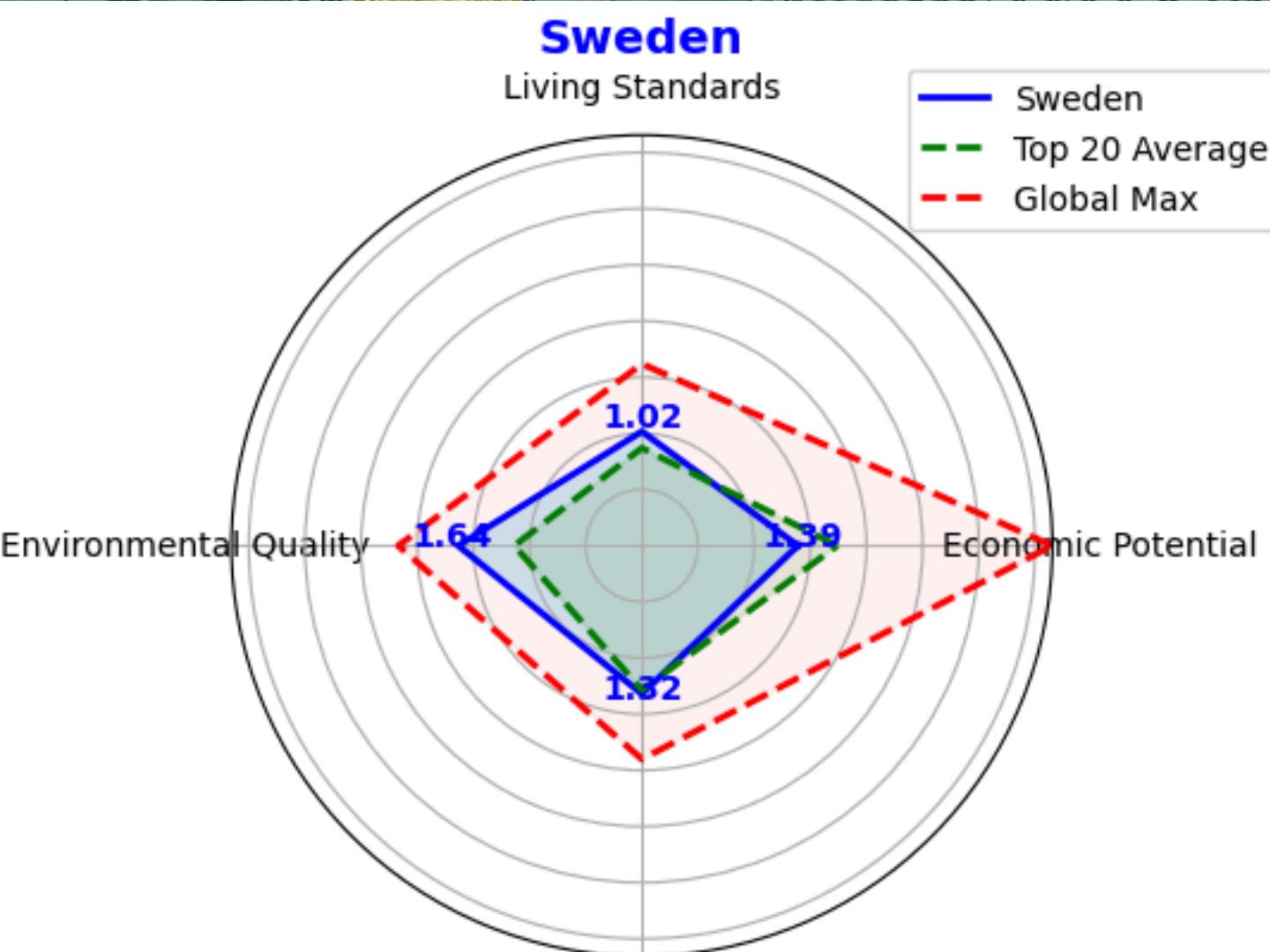
Finland ranks 7th globally its extreamly high environmental quality helps push the country to its position but the below average economic potential brings the country down

Composite Index

Sweden scored a 1.32 on the composite index, ranking it 6th globally



SWEDEN



Living Standards

Sweden scored a 1.02 is marginally above average indicating a above average standard of living in Sweden.

Environmental Quality

Sweden scored a 1.64 is on the higher end, closer to the maximum than the average. This is because Sweden uses a lot of green energy

Economic Potential

Sweden scored a 1.39 which is below average . Indicating a limited economic potential especially when compared to other European countries

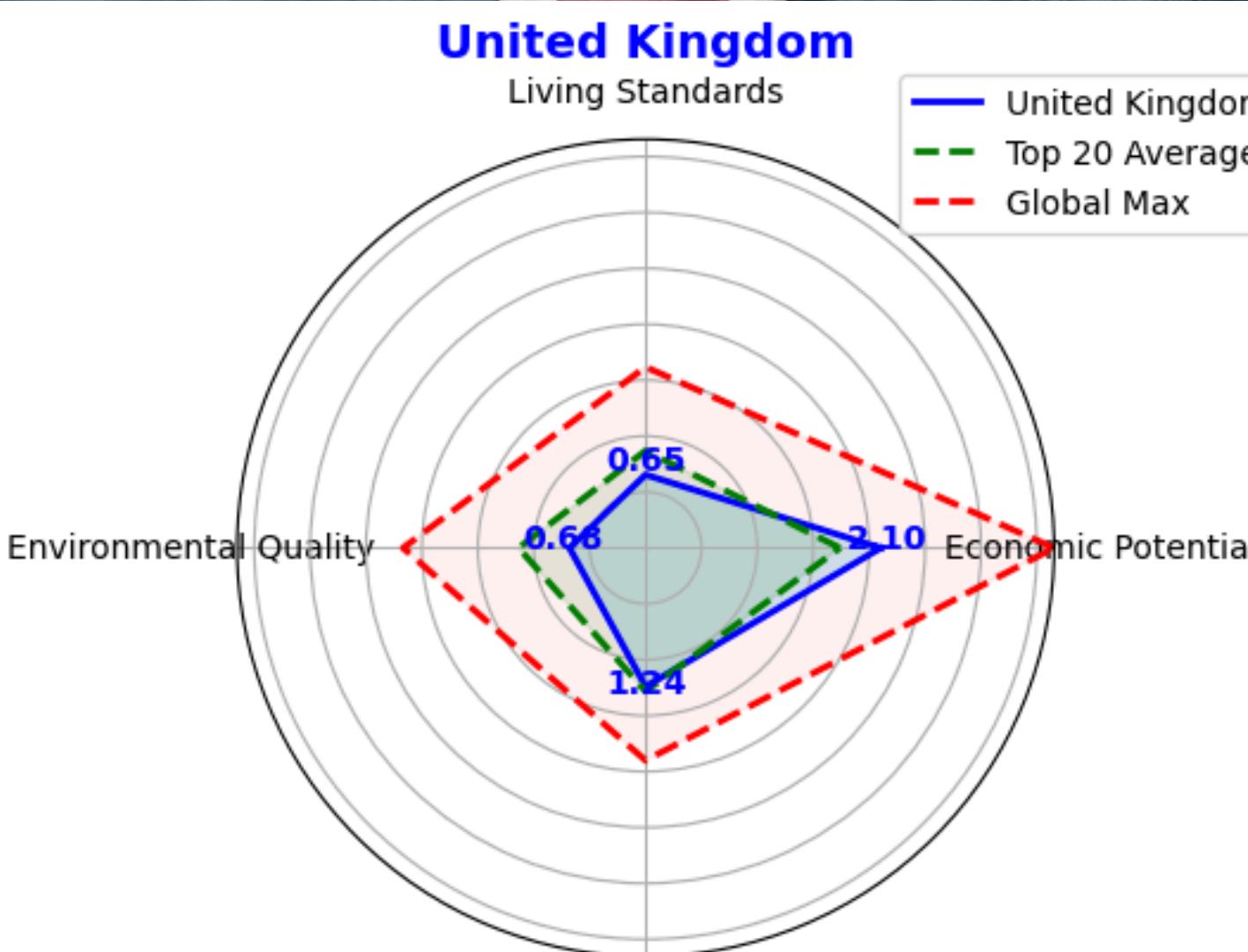
Conclusion

Sweden ranks 8th globally overall. The only real drawback is the below-average economic potential. The country also performs worse in every metric compared to its neighbouring country, Finland.

Composite Index

United Kingdom scored a 1.24 on the composite index, ranking it 7th globally

UNITED KINGDOM



Living Standards

United Kingdom scored a 0.65 which is below average which could be due to how expensive it is to live in the country

Environmental Quality

United Kingdom scored a 0.68 which is below average ranking compared to the other 20 countries.

Economic Potential

United Kingdom scored a 2.10 which is above average but is closer to the average rather than the maximum. This is because London is a global hub for all types of industries.

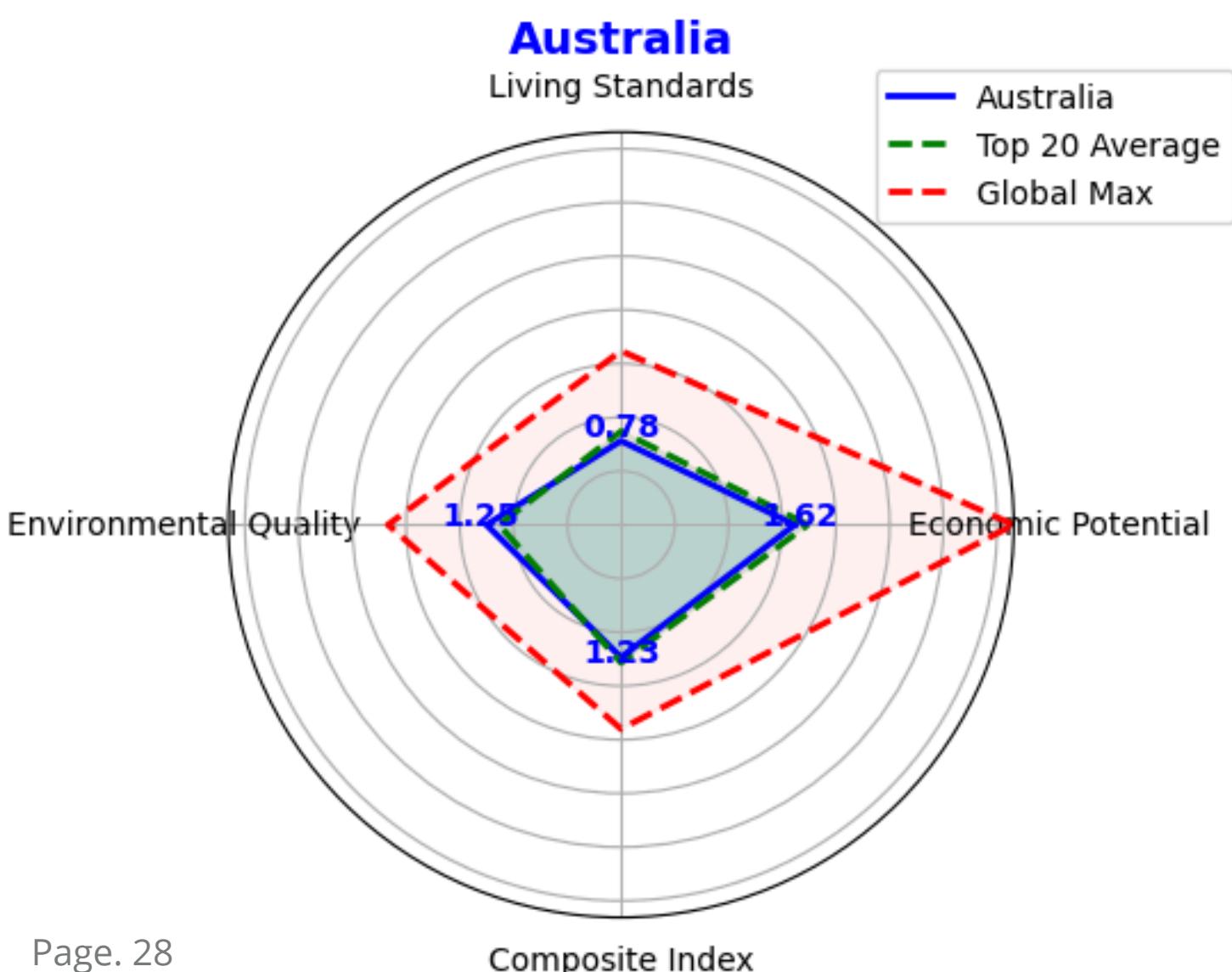
Conclusion

United Kingdom ranks 9th globally. It does well in the Economic Potential, and overall it is just above average on the composite Index, but the low Environmental Quality and Living Standard brings the country down to 9th.





AUSTRALIA



Composite Index

Australia scored a 1.23 on the composite index, ranking it 8th globally



Living Standards

Australia scored a 0.78 which is slightly below average but this is only by a couple of points .

Environmental Quality

Australia scored a 1.25, which is above the average. this is most likely due to the national recognition of importance in preserving the country's life and ecosystems..

Economic Potential

Australia scored a 1.62 is just below the average line which is a indication of a stable economy

Conclusion

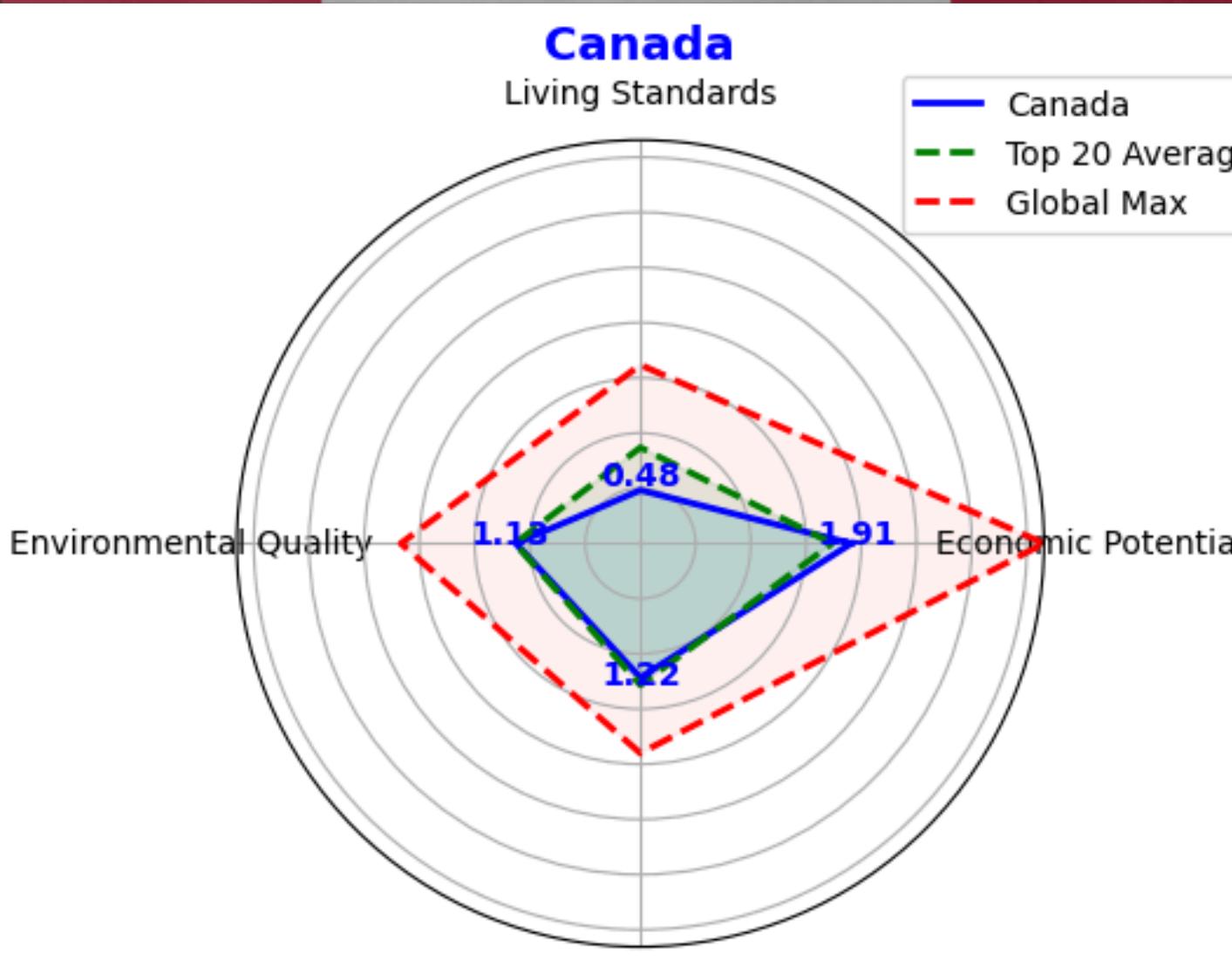
Australia ranks 10th globally. Overall, the country is just below average in each of the sub-indices having no real weakness or factors to draw someone to the country.

Composite Index

Canada scored 1.22 on the composite index, ranking it 9th globally



CANADA



Living Standards

Canada scored a 0.48 which is more than 50% lower compared to the average. Canada ranked the worst among all the countries in the top 20, which is a major concern.

Environmental Quality

Canada scored a 1.13 which is also average which indicating that the country is clean.

Economic Potential

Canada scored a 1.91 which is on the line of average meaning that the country economically is stable.

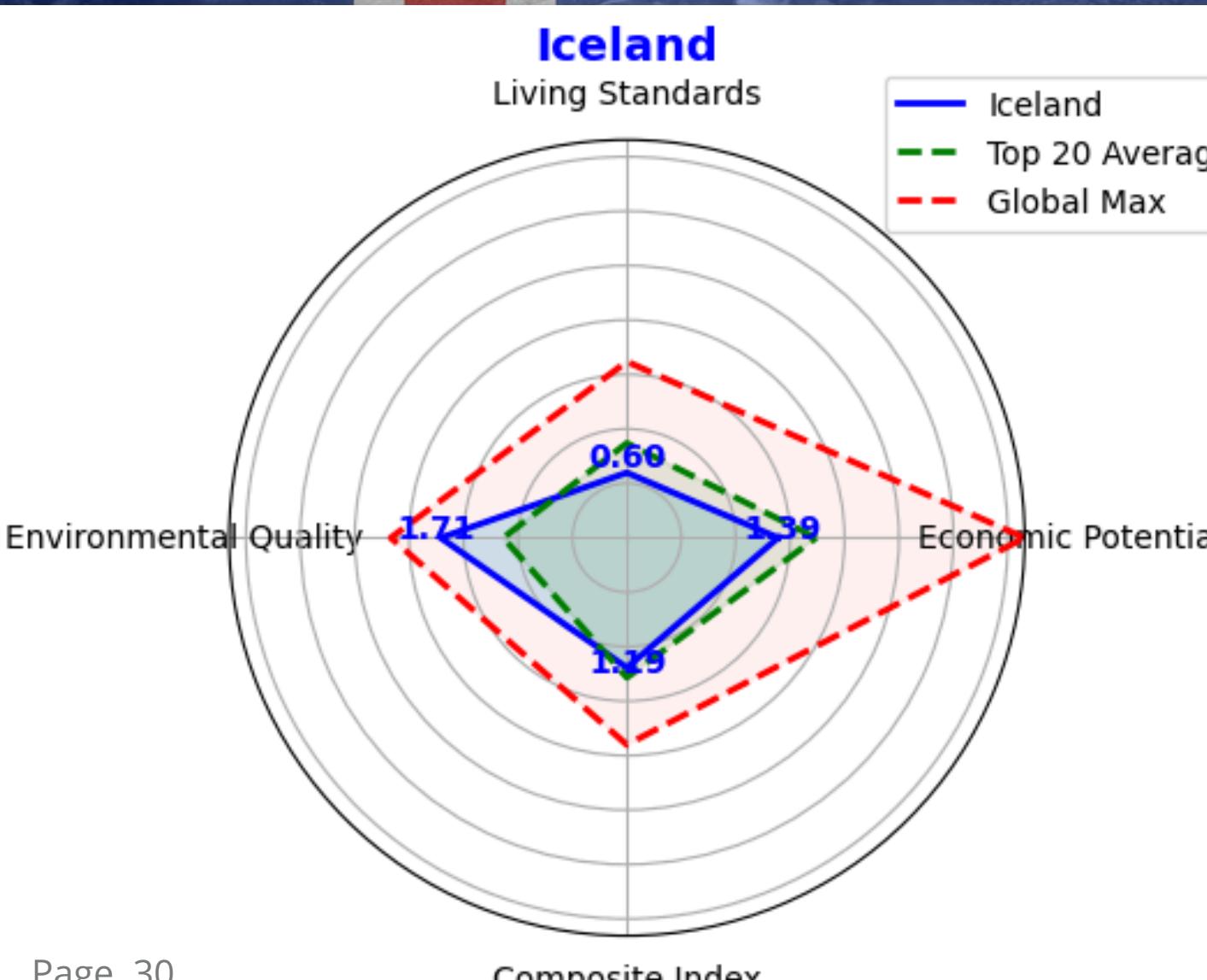
Conclusion

Canada ranks 11th globally . The country ranks on the line of average for most of the sub indexes but there is a significant drop when looking at the living standard which is a concern especially when wanting to relocate to a new country long term.

Composite Index

Iceland scored a 1.19 on the composite index, ranking it 10th globally

ICELAND



Living Standards

Iceland scored a 0.60 which is below average. This is due to the high cost of living in the country.

Environmental Quality

Iceland scored a 1.71, which is extremely high, close to the global maximum. This is most likely due to the low population and lack of industry in the country.

Economic Potential

Iceland scored a 1.39, which is below average. Indicating a limited economic potential, especially when compared to other European countries

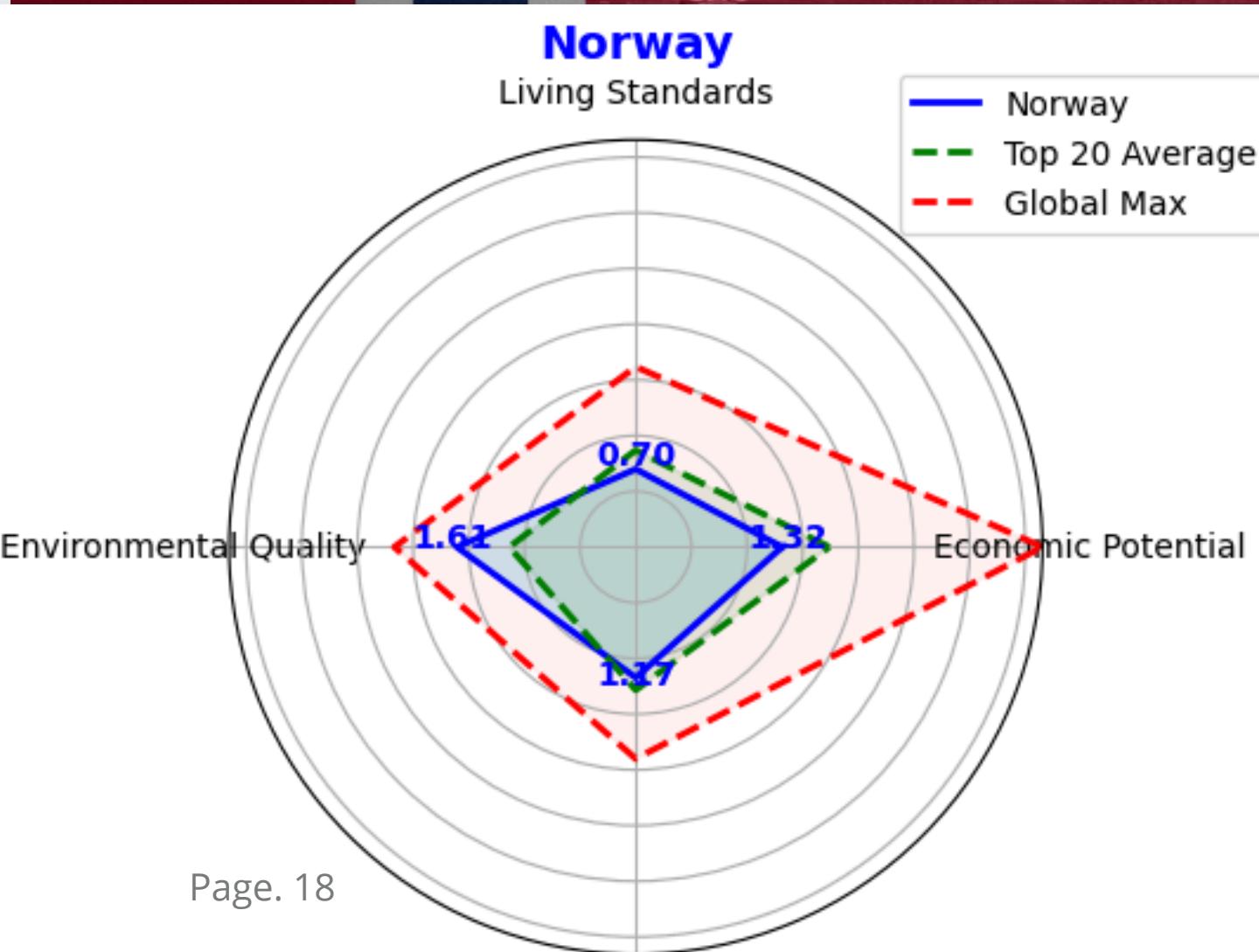
Conclusion

Iceland ranks 12th globally . Overall country is below average and the only reason for its high ranking is its extremely high Environmental Quality.

Composite Index

Norway scored a 1.17 on the composite index, ranking it 11th globally

NORWAY



Page. 18

Composite Index



Living Standards

Norway scored a 0.70 below average when compared to its neighbouring countries. This is due to the high cost of living in the country.

Environmental Quality

Norway scored a 1.61 is well above the average, just like what we had seen from its neighbouring countries of Sweden and Finland

Economic Potential

Norway scored a 1.32, which is below average. Indicating a limited economic potential, especially when compared to other European countries

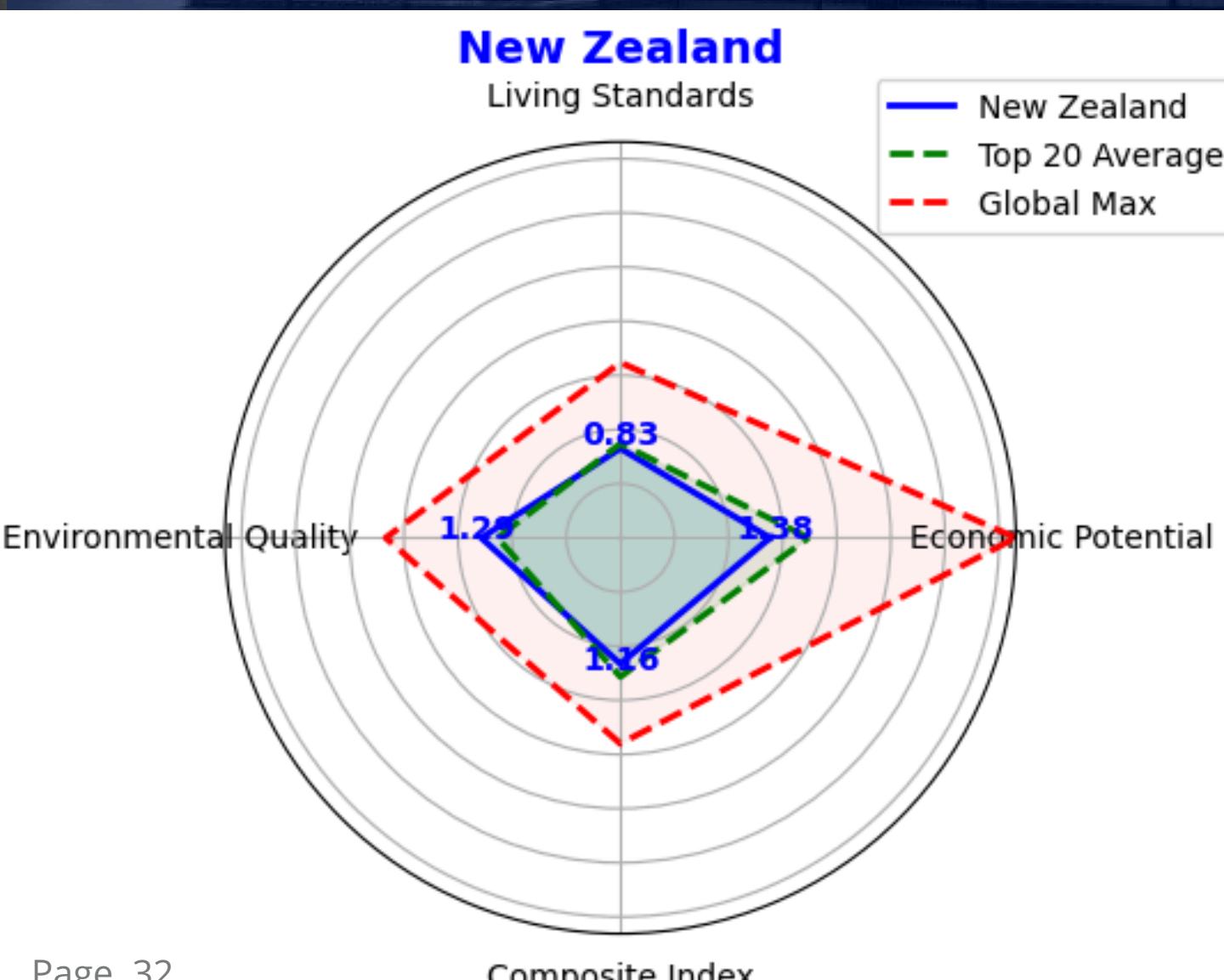
Conclusion

Norway ranks 13th globally. They have some of the best environmental quality in the world but has a below-average living standard and economic potential due to their limited economic diversity.





NEW ZEALAND



Composite Index

New Zealand scored a 1.16 on the composite index, ranking it 12th globally



Living Standards

New Zealand scored a 0.83 which is below average. This is due to the high cost of living in the country.

Environmental Quality

New Zealand scored a 1.29 marginally above average, and actually ranks higher than the neighbouring country of Australia.

Economic Potential

New Zealand scored a 1.38. Which is below the average this is due to the remoteness of the country which reflects in the wages in the country.

Conclusion

New Zealand ranks 14th globally . It is overall a very average country compared to the other 20 nations but overall performs worse when compared to Australia.

Composite Index

Qatar scored a 1.11 on the composite index, ranking it 13th globally

QATAR



Living Standards

Qatar scored a 1.14 which is above average. This is due to the recent influx of capital into the country in the recent years from the oil and gas trade

Environmental Quality

Qatar scored a -0.13 . Qatar is the only country that got a negative score from all the countries in any of the sub-indices, which is a major concern. But the country makes most of its money from natural gas, which is the reason for the negative figure.

Economic Potential

Qatar scored a 1.86 it is marginally above average due to the recent growth in the country making the economy more powerful .

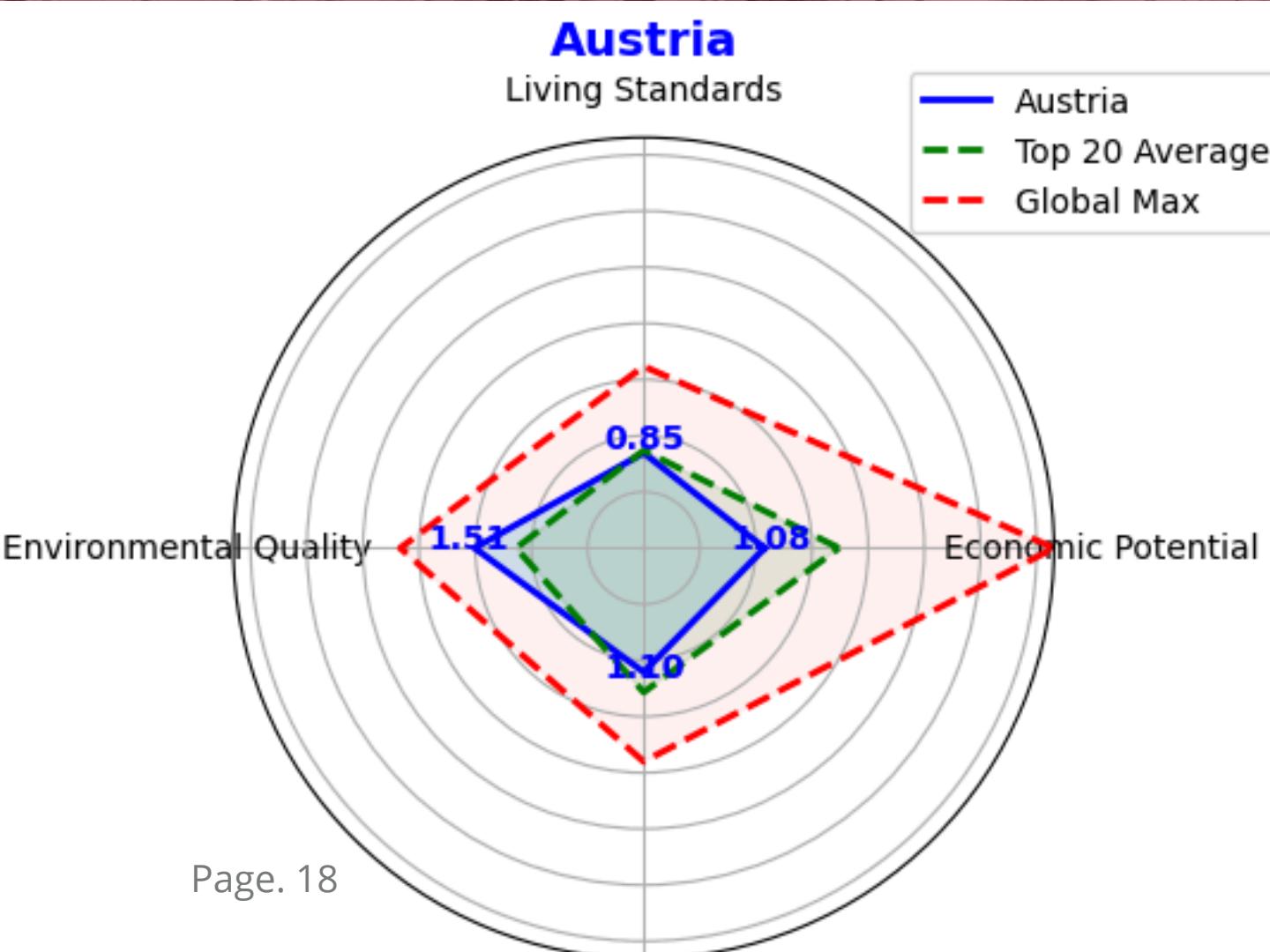
Conclusion

Qatar ranks 15th globally . The country does okay in two sub indeces but the negative environmental quality from the countries is a concern but the country makes most of its money from natural gas which is the reason for the negative figure.

Composite Index

Austria scored a 1.10 on the composite index, ranking it 14th globally

AUSTRIA



Living Standards

Austria scored a 0.85 which is below average. This is due to the high cost of living in the country.

Environmental Quality

Austria scored a 1.51 which is between the average and the maximum of the top 20 countries..

Economic Potential

Austria scored a 1.08 which is far below average. Indicating a low salary compared to the overall cost of living in the country

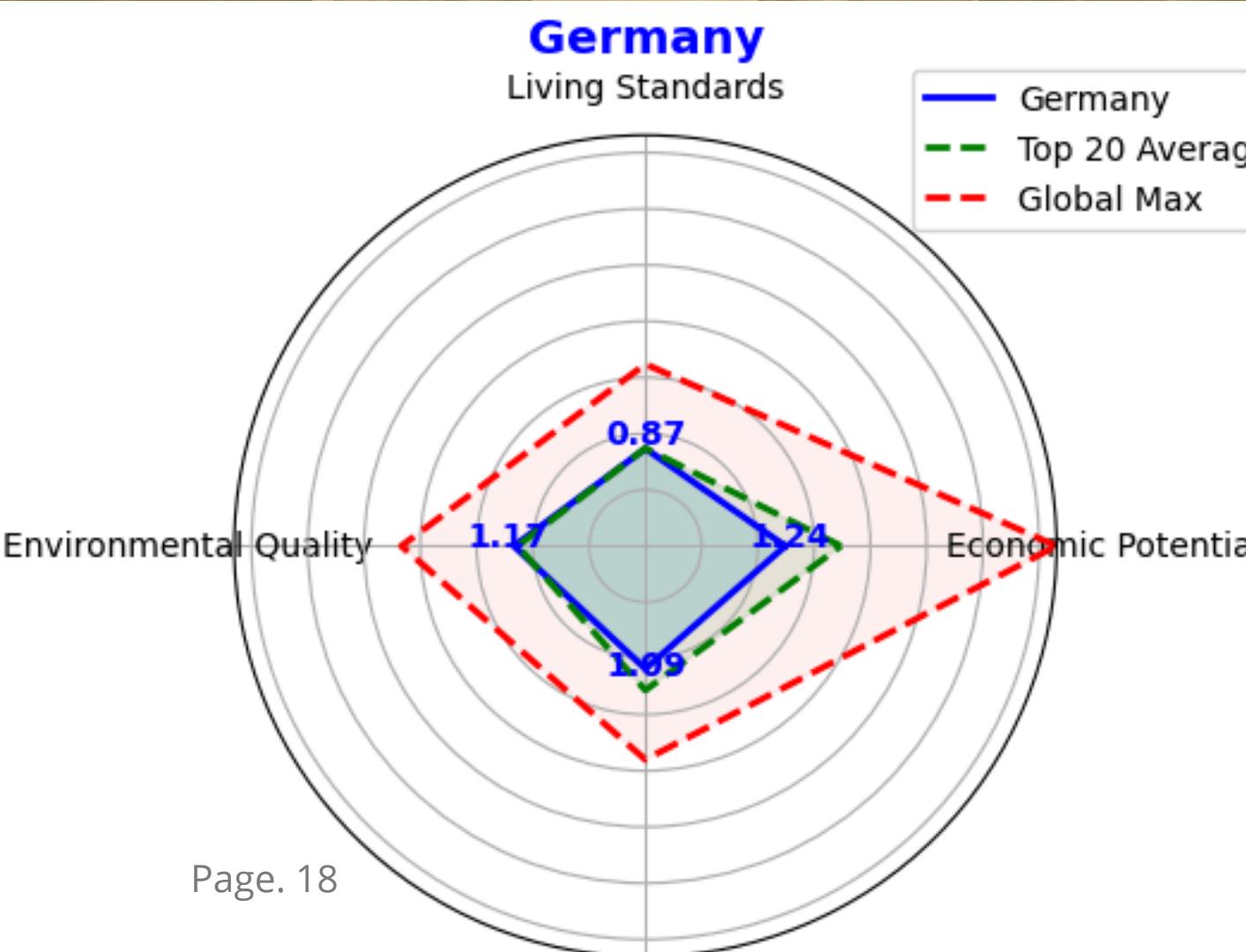
Conclusion

Austria ranks 16th globally . It ranks well below average for economic potential . But overall the country is slightly better then germany when it comes to the rankings.

Composite Index

Germany scored a 1.09 on the composite index, ranking it 15th globally

GERMANY



Living Standards

Germany scored a 0.87 which is below average. This is due to the high cost of living in the country.

Environmental Quality

Germany scored a 1.17 is very average compared to the other countries.

Economic Potential

Germany scored a 1.24 which is below average because of the salary not matching the purchasing power in the country

Conclusion

Germany ranks 17th globally . The country is outperformed by Austria which is the country that would be its direct comparison when it comes to the two countries.

Composite Index

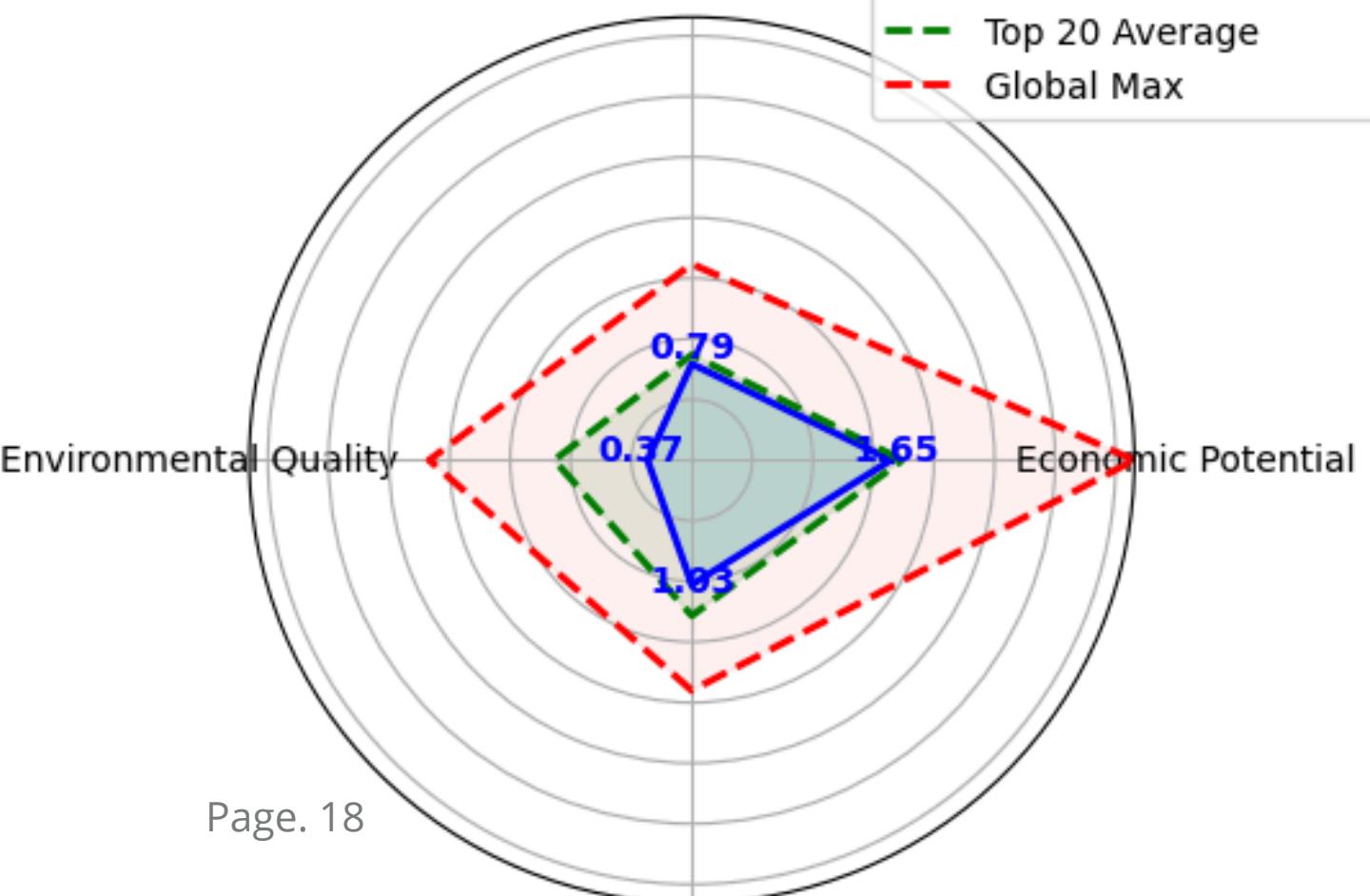
United Arab Emirates scored a 1.03 on the composite index, ranking it 16th globally

UAE



United Arab Emirates

Living Standards



Page. 18

Composite Index



Living Standards

United Arab Emirates scored a 0.79 which is below average. This is due to the high cost of living in the country.

Environmental Quality

United Arab Emirates scored a 0.37, which is well below the average. This is due to the UAE drilling for natural gas and oil, which is the reason for the low score.

Economic Potential

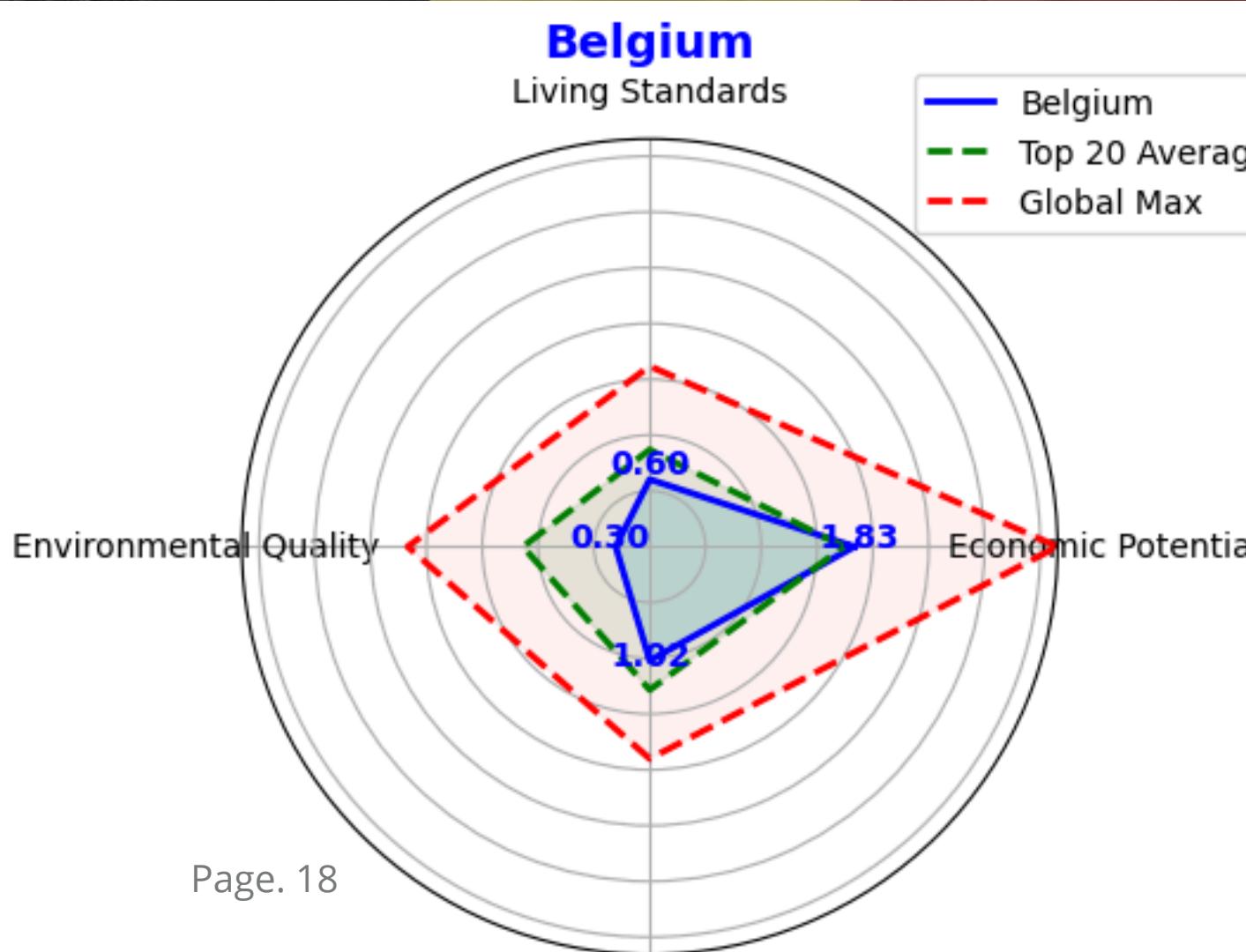
United Arab Emirates scored a 1.65 . This is just below the average . The salaries are high and there is no income tax but the purchasing power is limited due to the

Conclusion

United Arab Emirates ranks 18th globally. Overall the country is below average in each of the sub indeces and has little draw besides the economic potential . Especially when compared to a neighbouring country of Qatar.



BELGIUM



Page. 18

Composite Index

Composite Index

Belgium scored a 1.02 on the composite index, ranking it 17th globally



Living Standards

Belgium scored a 0.60 which is below average. This is due to the high cost of living in the country.

Environmental Quality

Belgium scored a 0.30 which is well below compared to other European nations. This is due to Belgium having the densest industrial cluster which has oil refineries and chemical plants.

Economic Potential

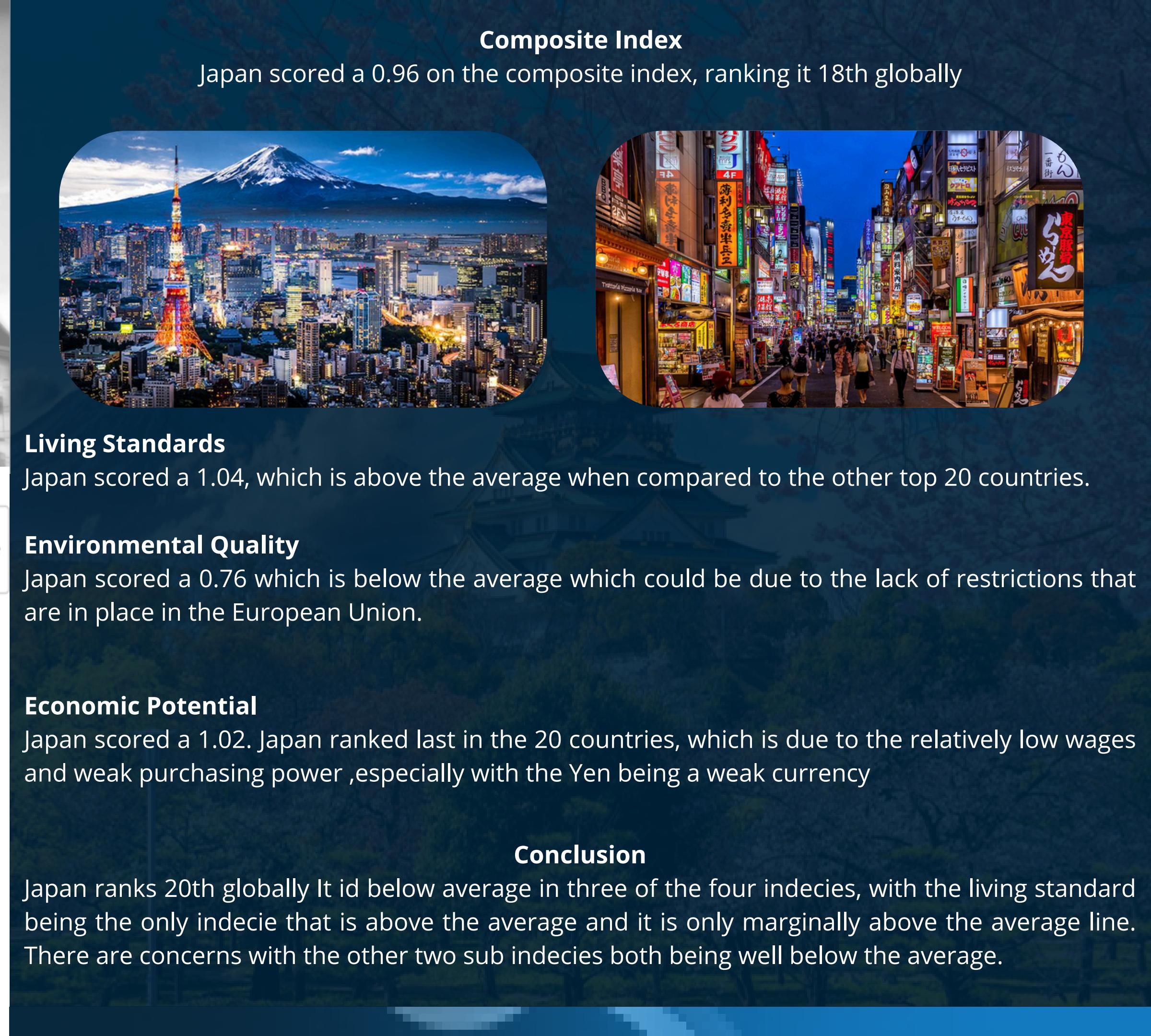
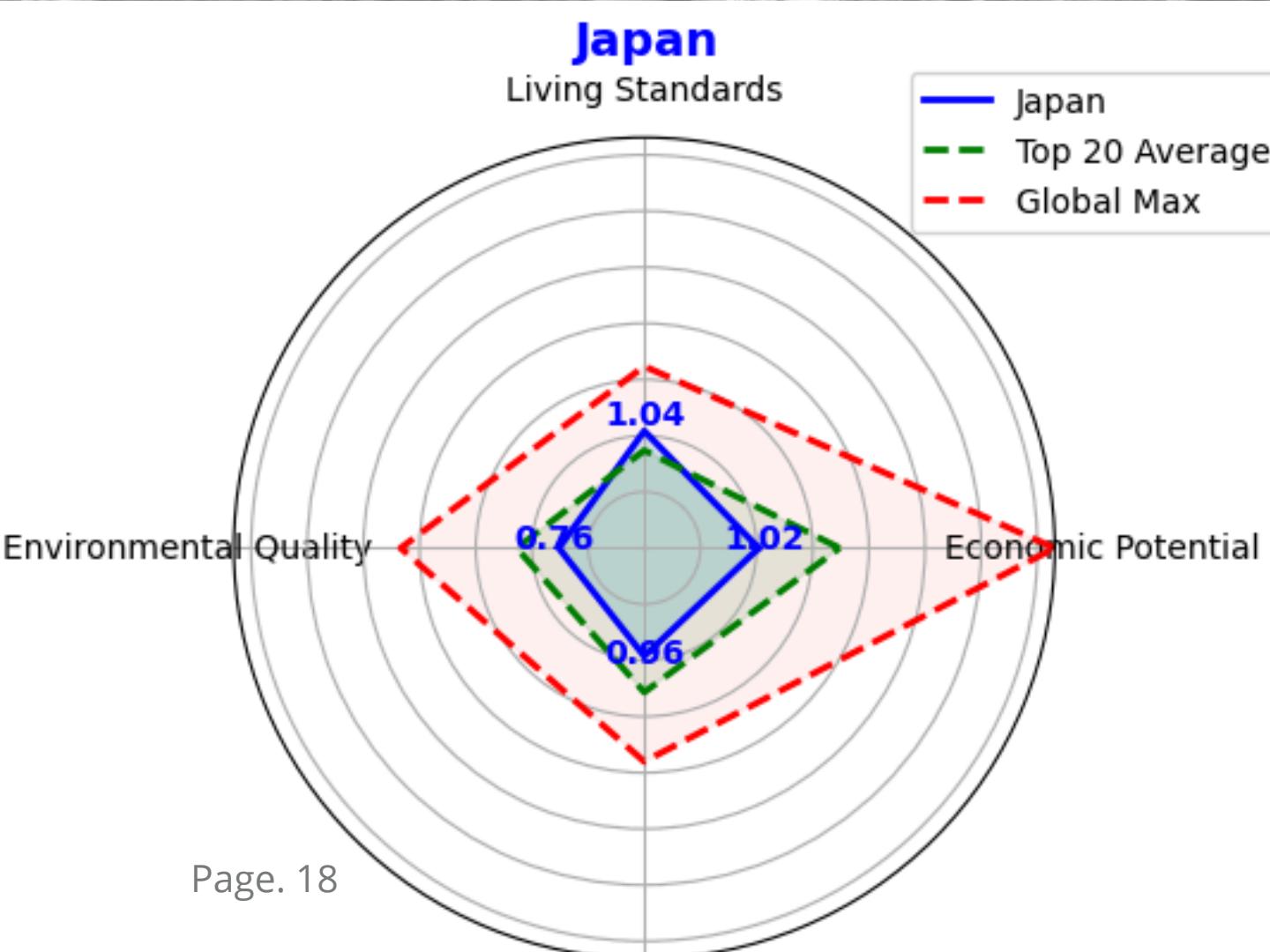
Belgium scored a 1.83 is just above average, indicating that the salary and purchasing power of your money in Belgium is pretty average when compared to the other global countries.

Conclusion

Belgium ranks 19th globally. The country is below average especially when it comes to the environment. It boosts its overall global ranking with its economic potential but it still leaves the country near the bottom of the top 20 countries.



JAPAN



GITHUB LINK



NojusMat/DataVisCA1

Contribute to NojusMat/DataVisCA1 development by creating an account on GitHub.

 GitHub

[HTTPS://GITHUB.COM/NOJUSMAT/DATAVISCA1](https://github.com/nojusmat/datavisca1)

COVERSHEET


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**Continuous Assessment
Cover Sheet**

| | | |
|---|---------------------------|---|
| Student Name: Nojus Matusevicius | Student Number: D00249674 | |
| Programme: Computing in software development | Stage: 4 | Complete Student Checklist: Re-read brief <input checked="" type="checkbox"/> References and Bibliography <input type="checkbox"/> Proofread <input checked="" type="checkbox"/> |
| Module: Data Analysis & Visualisation | | |
| Due Date: 8/05/2025 | No. Pages: | |
| Lecturer(s) Name: Dr John Loane | | |
| Assignment No. and/or Description/Topic: CA1 | | Mode of Submission: Softcopy <input checked="" type="checkbox"/> Hardcopy <input type="checkbox"/> |
| DECLARATION: I declare that: <ul style="list-style-type: none">This work is entirely my own, and no part of it has been copied from any other person's words or ideas, except as specifically acknowledged through the use of inverted commas and in-text references;No part of this assignment has been written for me by any other person except where such collaboration has been authorised by the lecturer(s) concerned;I have not used generative artificial intelligence (AI) (e.g. ChatGPT) unless it has been permitted by the lecturer(s) concerned;I understand that I am bound by DkIT Academic Integrity Policy. I understand that I may be penalised if I have violated the policy in any way;This assignment has not been submitted for any other module at DkIT or any other institution, unless authorised by the relevant Lecturer(s);I have read and abided by all of the requirements set down for this assignment. | | |
| SIGNATURE.....Nojus Matusevicius..... | | DATE.....08/05/2025..... |
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| Work submitted late will be subject to penalties in accordance with the DkIT Continuous Assessment Policy | | |

Also available on my github