Title:-

Decadal Dynamics Trends: Urbanization, Economic Fluctuations, and Sustainability Indicators Across the Globe

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Abstract:-

This analysis synthesizes a decade of global data, revealing how urban growth aligns with shifts towards urban centers. Economic trajectories, captured through GDP fluctuations, indicate varying degrees of progress and resilience to global challenges. CO2 emissions data points to the environmental footprint of nations, with some trends suggesting a move towards greener practices. Energy consumption data reflects the demands of industrialization and lifestyle patterns, underscoring the balance between development and sustainability. Together, these indicators weave a complex narrative of modern development's interdependent facets.

GitHub link: - https://github.com/aberah29/decadal-dynamics-trends

Decadal Dynamics Trends: Urbanization, Economic Fluctuations, and Sustainability Indicators Across the Globe

The study examines a decade's worth of data from nations across different continents to understand how critical elements affecting both the economy and the environment are interrelated. The elements scrutinized include the size of urban populations, economic expansion as measured by GDP growth, carbon dioxide emissions, and the consumption of energy.

The displayed graphic represents varied examinations based on global indicators from the World Bank, spanning several nations
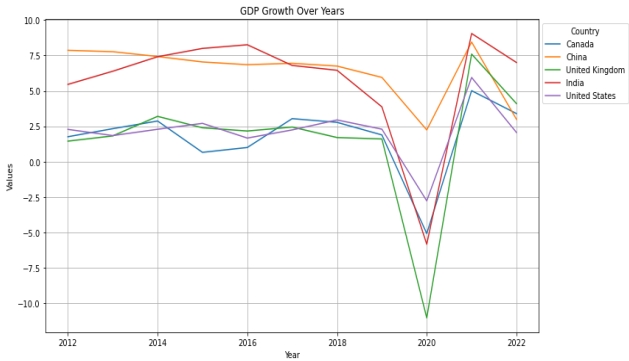

Figure 1

In figure 1 Canada displayed stability, China's once-rapid growth showed signs of slowing. The UK's steady economy experienced a notable dip around 2020, mirroring a global trend. India, after a significant 2020 downturn, rebounded sharply, demonstrating robust recovery. The US similarly faced a considerable decline during the same period but illustrated a strong resurgence, highlighting the resilience of its economy.
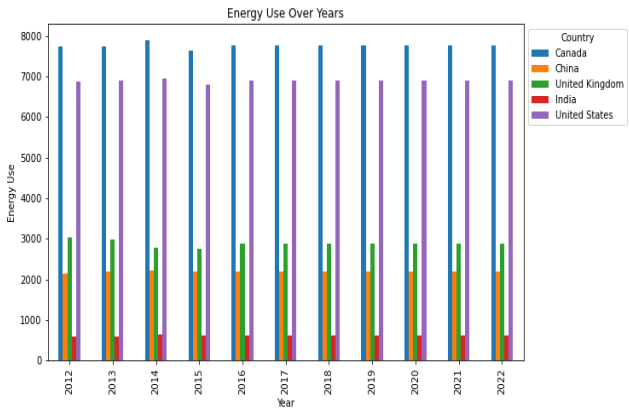

Figure 2

The bar chart presents a comparative view of energy consumption across five nations over 2010 to 2022. The United States' bars tower over the rest, indicating the highest energy use consistently across the timeline. China, too, shows substantial energy consumption, second only to the US, reflecting its rapid industrialization and extensive manufacturing base. In contrast, the energy use in Canada, the United Kingdom and India is markedly lower, with Canada slightly ahead of the UK and India, which

maintain the lowest tiers of energy use in this group. Throughout the years, the pattern remains relatively consistent without significant fluctuations, highlighting the persistent energy demands of these economies.
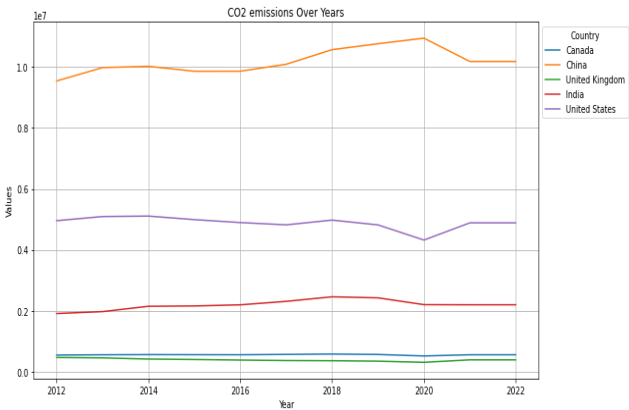

Figure 3

The graph showcases China stands out with the highest emissions, maintaining a lead far above the others throughout the decade. The United States follows, with a significant but notably lower emission level than China. Both countries show a semblance of stability in their emission trends. In comparison, the United Kingdom, India, and Canada exhibit considerably lower CO2 emissions, with the UK and Canada displaying a gentle decline, hinting at efforts towards a greener economy.
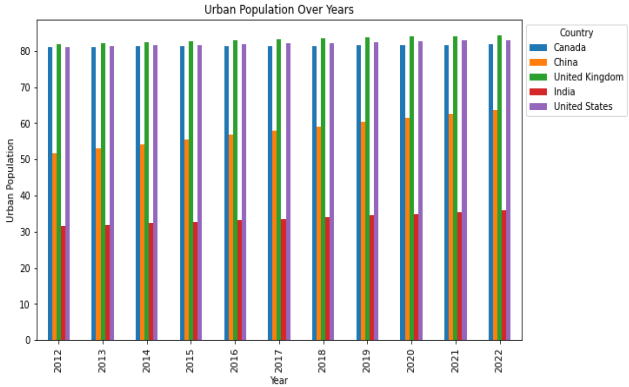

Figure 4

The trend graph depicting urban dwellers shows that the majority of people in Canada, the United

Kingdom, and the United States reside in urban areas. Remarkably, China's and India's line shows a steady climb in its city-dwelling populace, indicating an ongoing shift towards urban life.
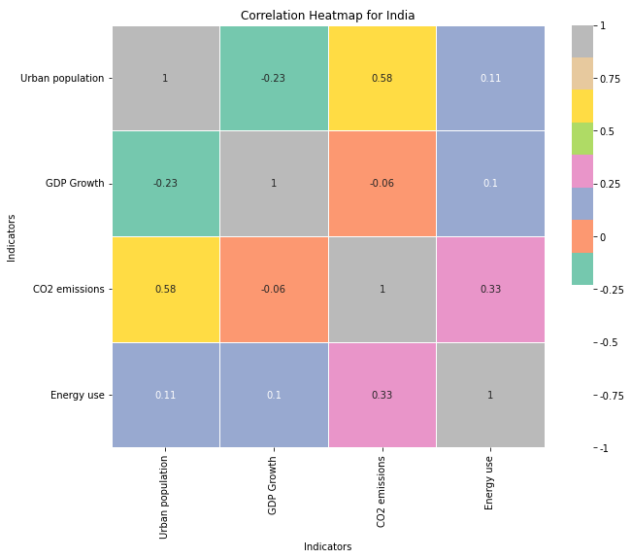

Figure 5

In this figure 5, the correlation heatmap for India reveals distinct relationships between various socio-economic indicators. Urban population and CO2 emissions are positively correlated, suggesting that as more people live in urban areas, emissions rise. Interestingly, GDP growth seems to be independent of urban population and CO2 emissions, as indicated by the negligible correlation values. Energy use has a moderate correlation with CO2 emissions, which could imply that as energy consumption increases, so do emissions, but the relationship is not strong enough to suggest a direct proportionality.
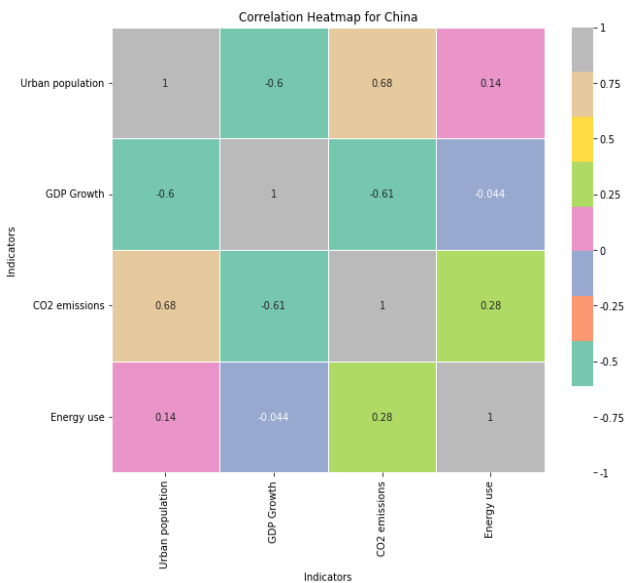

Figure 6

In figure 6, China illustrates a strong negative correlation between urban population and GDP growth. Conversely, there's a strong positive correlation between urban population and CO2 emissions. GDP growth and CO2 emissions are also negatively correlated. Energy use shows a complex energy landscape. This snapshot of China's indicators sheds light on the intricate balance between urbanization, economic performance and environmental impact.

The following tables shows the results of engaging numerous statistical approaches to demeanor a comparative exploration amid countries and factors. However 1,2,3,4 characterize Urban Population, GDP Growth, CO2 Emissions, Energy Use.

	Canada	China	UK	India	USA
1	81.39	57.84	83.13	33.66	82.08
2	1.79	6.39	1.59	5.71	2.14
3	556671	10180550	389159	2197113	4885941
4	7751.58	2192.73	2893.10	608.98	6885.58

The above table stated the different factor's average values for 2012 to 2022. This table shows that in urban population UK is at peak while China is peak at GDP Growth.

	1	2	3	4
skewness	-18744.08	18744.08	-8.14	-7.51
kurtosis	4.99	4.99	7.78	3.17

Overall, these statistics suggest that India's urban population and GDP growth data might have experienced specific atypical years with dramatic changes, whereas CO2 emissions and energy use appear to be more stable but still contain a few notable extreme values.