Fact Sheet: Statistical analysis on Global Innovation Index

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Background and scope

This project shows how the G20 countries have focused on innovation from 2015 to 2024.
It focuses on two sides of innovation:
Input innovation: The efforts Country puts in(money, research, talent, policies)
Output innovation: The results they actually receive(patents, new technologies, creative products)
The aim is to understand how well countries turn resources into real innovation and the special focus is on India, to understand how much it has improved and where it stands compared to other countries.

Introduction to the innovation index

Global Innovation Index(GII): Global Innovation Index (GII) helps us know how good a county is in innovation

The 7 pillars:

The 5 inputs(material,thing a county would invest on):

- institutions(support by government , stability and law)
- research and human capital(research and development,education)
- infrastructure(technology access,logistics)
- market (trade,investment)
- business(linkages with research)

The 2 outputs(result):

- technology and knowledge outputs
- creative outputs

Innovation Efficiency Index(IEI)

IEI tells that how good inputs are transformed into outputs
Formula: IEI = Output score/Input score
when a country uses its resources carefully and smartly its IEI gets higher
and when a country try to input things but doesn't get any result its IEI gets lower.

What statistical parameters were used in the study:

Descriptive analysis

- It was used to observe overall patterns over the last few years.
- It shows averages, recent trends and the changes in innovation levels.

Relational analysis

- Checks if there is any relationship between GDP per capita and Global innovation index(GII).
- To know if higher economic growth leads to better innovation.

Predictive analysis

- Compares output of innovation with input of innovation.
- To predict how efficiently the countries might innovate in future.

Hypothesis testing

- Tests whether India's innovation growth is connected to its economic growth.
- Tests whether the countries that are already well developed innovate more efficiently than developing countries.

Ranking of countries(IEI Ranking 2015 - 2024)

Top performers	Bottom performers
China : Most efficient in converting its input into real innovation outputs. Germany : Performs better because of it's advanced technology and powerful research. United kingdom : Balanced input and output performance. Korea : Known for excellent R&D and fast technology development.	Saudi arabia : Good input but not efficient enough to produce real innovation outputs. South Africa : Majorly struggles with research, infrastructure and output generation. Brazil : Its innovation system is improving but slowly and it is still behind other G20 countries.

India's SWOT Analysis:

Strengths: 1. Strong GDP and GII linkage 2. Stable Institutional foundation 3. Proven Improvement Trajectory 4. Established Digital and Market Base	**Weakness:** 1. Critically low performance in Human capital & research 2. Weak Business sophistication 3. Gaps in infrastructure 4. Hard to get funding
Opportunities: 1. Fix weak areas that will boost the rank and benefit the country 2. The problems are known. We need to work on these problems: Business S. and HC & R. 3. Learn from efficient peers 4. Developing countries can also use Policies and implement them properly	**Threats:** 1. Risk: Economy may slow down if the weak pillars related solutions are not implemented 2. Global competition 3. Complacency in developed nations

Tests and Interpretation:

Test-1: Developed vs Developing countries(t-test, Desc. Stats, Hypothesis)

Results: No significant differences in innovation efficiency.

Test-2: India's GDP vs GII (Correlation, Desc. Stats, Hypothesis)

Results: Strong positive correlation

Test-3: India vs G20 Pillars (Desc. Stats, Gap analysis, Correlation, Hypothesis, cross sectional correlations)

Results: largest innovation gaps in 2 input pillars dragging down India's overall performance

India's Overall Position

India currently lies at the middle position among G20 countries in terms of innovation efficiency.

India's GII score improved from 31.7 to 38.3 showing consistent growth over the decade.

There is a very strong relationship between GDP per capita and Global innovation index(GII).

India is indeed moving forward but it still needs to perform more better to match the top nations.

Future projection

If India continues on its current path, its innovation capabilities will keep on improving.
A major focus in areas like education, research , market and industry innovation can help India to move more closer towards the top performing nations.

Ambiguites :

1. **National averages hide differences:** looking at only India's overall score ignores major differences in innovation performance across individual states.
2. **Low efficiency across G20:** most of the countries have IEI values below 1.0 showing that achieving full innovation efficiency is difficult which make comparisons tricky.
3. **Rough country classification:** using median GDP to label countries as developed or developing can misplace economies like china and saudi arabia and it really doesn't fully reflects innovation capability

Data Source: World Intellectual Property Organization (WIPO). (2025). Global Innovation Index 2025 Database.