

ANALYSIS OF RESEARCH AND DEVELOPMENT IN PAKISTAN: AN ALTERNATIVE APPROACH



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Background

The existing literature establishes that innovation leads to sustainable economic growth and prosperity which brings about an uplift in the living standards of the people. Due to its association with economic growth, innovation performance has long been a topic of interest in contemporary business fields (e.g., Dekoulou and Trivellas, 2017; Jian et al., 2021; Wang and Tan, 2021; PIDE, 2002). To assess innovation performance, the World Intellectual Property Organization (WIPO) calculates the Global Innovation Index (GII) for global economies based on 81 distinct indicators grouped under seven pillars that define innovation performance. The index comprises two primary dimensions: i) innovation inputs, and ii) innovation outputs. These two dimensions additionally include seven pillars. Similarly, Innovation Input encompasses the political environment, human capital and research, infrastructure, market sophistication, and business sophistication, whereas Innovation Output pertains to the knowledge creation of each economy. GII evaluates the innovation ecosystem of countries annually, emphasizing their strengths and weaknesses in innovation, as well as specific gaps in innovation metrics. In short, GII allows global economies to assess their standings and evaluate their policies to improve innovation performance. The

Global Innovation Index for 2023 (GII-2023) identifies Switzerland, Sweden, the USA, and the UK as the top economies in the innovation ranking (Khan et al., 2017).

GII-2023 for South Asia: A Comparison among Pakistan, India, and Bangladesh

The three major economies in South Asia are Pakistan, India, and Bangladesh. An analysis of these factors will enhance understanding of which economy is excelling in GII-2023, as the innovation capability also assesses the capacity of countries to leverage new technologies that facilitate inclusive and sustainable economic growth. The comparison between India and Pakistan is essential, as both nations are regarded as rivals across various domains.

The GII-2023 report indicates that Pakistan’s economy ranks (88th) out of 132 countries, showing an improvement compared to the years 2019-21. Although there has been an improvement in the GII compared to previous years, the global ranking remains unsatisfactory. When comparing the GII ranking of the country with India, Pakistan appears to be significantly behind, although it holds a somewhat more favourable position relative to Bangladesh (table 1).

Table 1: Ranking on Global Innovation Index (GII)

Years	Pakistan	India	Bangladesh
2023	88 th	40 th	105 th
2021	99 th	46 th	116 th
2020	107 th	48 th	116 th
2019	105 th	52 th	116 th

Source: WIPO GII Report (2023)

The segregation of the GII into seven sub-indices reveals that Pakistan’s performance across most innovation pillars is relatively low—market sophistication (97th), human capital and research (117th), infrastructure (120th), business sophistication (72nd), and knowledge and technology inputs (69th). Pakistan is demonstrating underperformance, particularly in the areas of market sophistication and human capital and research (table 2). In contrast to the previously mentioned points, India’s performance across all major seven pillars of the innovation index is notably strong, particularly in market sophistication (20th), knowledge and technology inputs (22nd), and business sophistication (57th). Additionally, India ranks (48th) in human capital and research indices. However, Bangladesh is positioned lower in the rankings compared to Pakistan. India’s high ranking on the Global Innovation Index reflects the effectiveness of its policies aimed at enhancing innovation. In contrast, Pakistan lacks robust and effective policies to improve its position on the global innovation index (PIDE, 2011; PIDE, 2016).

Table 2: Ranking on Seven Pillars of Global Innovation Index in 2023

	Pakistan	India	Bangladesh
Knowledge and Technology Inputs	69	22	89
Creative Outputs	70	49	82
Business Sophistication	72	57	126
Institutions	113	56	108
Infrastructure	120	84	93
Human Capital and Research	117	48	125
Market Sophistication	97	20	100

Source: WIPO GII Report (2023)

The previously mentioned seven dimensions are further supported by sub-indices, which illustrate the broader aspects of the innovation index. Human Capital and Research encompasses three indicators: education, tertiary education, and research & development. India holds a superior ranking in education at (88th), whereas Pakistan is positioned at (121st). This clearly indicates that India's performance is comparatively stronger than that of both Pakistan and Bangladesh. The education metrics encompass expenditure on education as a percentage of GDP, school life expectancy, PISA scales in reading, mathematics, and science, as well as the teacher-pupil ratio, which serve as sub-indicators for education. This indicates that Pakistan is not performing as well in these indicators compared to India (PIDE, 2020; PIDE, 2023)

Table 3: Innovation Performance by Sub-Indicators in 2023

Seven Pillars of Global Innovation Index	Pakistan	India	Bangladesh
Human Capital and Research			
Education	121	88	128
Tertiary Education	119	65	111
Research and Development	62	32	76
Business Sophistication			
Knowledge workers	101	81	119
Innovation Linkages	54	59	100
Knowledge Absorption	57	41	120
Knowledge and Technology Outputs			
Knowledge Creation	57	44	95
Knowledge Impact	63	9	62
Knowledge Diffusion	79	29	106
Infrastructure			
Information and Communication technology (ICT)	107	82	90
General Infrastructure	132	46	93
Ecological Sustainability	113	128	96
Institutions			
Political Environment	105	69	109
Regulatory Environment	116	68	122
Business Environment	98	47	76
Market Sophistication			
Credit	103	56	86
Investment	81	17	92
Trade, Diversification, and Market Scale	75	9	96
Creative Outputs			
Intangible assets	52	38	73
Creative Goods and services	117	56	108
Online Creativity	65	66	87

Source: WIPO GII Report (2023)

In tertiary education, India is outperforming Pakistan, with India ranked (65th), while Pakistan holds the (119th) position and Bangladesh is at (111th) in the rankings for tertiary education. It indicates that Pakistan is not only trailing behind India but also behind Bangladesh. The tertiary sub-index encompasses tertiary enrollment, graduates in science and engineering, and inbound mobility at the tertiary level. Furthermore, the realm of research and development encompasses researchers, expenditures on R&D, global corporate R&D investors, and QS university rankings, all of which serve as significant sub-indicators within this dimension (PIDE, 2024).

As previously discussed, Pakistan's ranking in the area of Business Sophistication is notably low, with its sub-indicators including knowledge workers, innovation linkages, and knowledge absorption. In the realm of knowledge workers, Pakistan holds the (101st) position, whereas India occupies the (81st) position, indicating that India is outperforming both Pakistan and Bangladesh. The detailed analysis of knowledge workers indicates that India is excelling in knowledge-intensive employment, with firms providing formal training, business-led GERD, and the employment of women holding advanced degrees (Waheed, 2017)

Furthermore, the ranking on Innovation Linkages indicates that Pakistan is performing exceptionally well at (54th) place, while India holds the (59th) position and Bangladesh is at (100th). The sub-indicators include collaboration between universities and industry in research and development, the current status of cluster development and its depth, the percentage of Gross Expenditure on Research and Development financed from abroad relative to GDP, and the number of patents. Similarly, India excels in the Knowledge Absorption dimension of the innovation index. The performance of Pakistan in the area of Knowledge and Technology Outputs is notably low, with the country ranking (57th) in knowledge creation, (63rd) in knowledge impact, and (79th) in knowledge diffusion. India is performing exceptionally well in the specified indicators, holding the (44th), (9th), and (29th) positions in knowledge creation, knowledge impact, and knowledge diffusion, respectively.

The three major dimensions outlined above play a significant role in positioning the country on the innovation-based performance index. The fourth significant pillar of the (GII) is Institutions, which encompasses the political environment, regulatory environment, and business environment. India demonstrates notable strengths in its political and regulatory frameworks when compared to Pakistan and Bangladesh. Meanwhile, Pakistan has made relative improvements in its business environment ranking, currently positioned at (98th), whereas India stands at (47th) and Bangladesh at (76th). Currently, we have identified that India is excelling compared to Pakistan in the business environment. The three pillars are illustrated in (Table 3), which clearly shows that Pakistan's performance in the remaining dimensions of the global innovation index is significantly lower than that of India, although it is relatively better than that of Bangladesh (PIDE, 2020).

Concluding Remarks

The aforementioned discussion concludes that while Pakistan has made progress in its ranking on the global innovation index in 2023 compared to previous years, it still lags behind other global economies. It requires significant effort to rank among high-performing economies. Nonetheless, the comparison between India indicates that India is excelling in all seven pillars of the GII-2023 when compared to Pakistan and Bangladesh, while Pakistan's performance is relatively superior to that of Bangladesh (Waheed, 2017)

The World Intellectual Property Organization (WIPO) indicates that the presence of graduates in science and engineering, significant investments in global corporate research and development, a wealth of knowledge capital, and a thriving start-up ecosystem are key contributors to the ongoing enhancement of the Indian economy as reflected in the Global Innovation Index (GII). They further indicate that India's scientific departments associated with atomic energy, science and technology, biotechnology, and the department of space have made substantial contributions to enhancing innovation performance on a global scale. Furthermore, factors such as political stability, government effectiveness, and macro-economic conditions are key reasons for achieving higher rankings on the global innovation index in comparison to other South Asian economies like Pakistan and Bangladesh.

In contrast to India, Pakistan encounters several challenges in establishing itself among the highly innovative economies, including i) inadequate quality of human capital, ii) insufficient budgetary allocation for research and development, particularly in science and technology sectors, iii) lack of connections between universities and industry, and iv) weak political and economic institutions. Pakistan must focus intensively on the seven pillars of GII, particularly in the areas of human capital and research, business sophistication, knowledge and technology outputs, institutions, and related infrastructure (PIDE, 2017).

Key Messages

- Pakistan ranked 88th out of 132 countries in the Global Innovation Index (GII) 2023, trailing significantly behind India (40th) but performing better than Bangladesh (105th).
- Pakistan struggles in key areas like human capital and research (117th), infrastructure (120th), and market sophistication (97th), while India excels across all seven pillars, particularly in knowledge, market, and business sophistication, highlighting its strong innovation policies.
- Pakistan's lower global ranking is largely due to ineffective policies in the science, technology, R&D, and education sectors.
- Political stability, effective governance, and improved economic conditions are critical for Pakistan to improve its innovation performance and rank better globally.



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