

CHARTING INNOVATION ACROSS A TOUGH YEAR

In its fourth year, **THE GLOBAL INNOVATION HUBS INDEX** reveals more insights about the cities that led innovation in 2023 amid uncertainty and changing global trends.

During 2023 persistent uncertainty took its toll on global innovation — interest rates and inflation soared, global conflicts raged and the effects of the COVID-19 pandemic lingered. Yet despite the bleak economic landscape, the fourth offering from the Global Innovation Hubs Index (GIHI) has found unexpected bright spots and gained deeper insights into cities that have succeeded at innovation.

“Innovation is key for growth, but it is a complex process integrating many social and economic activities, making it difficult to measure,” says GIHI’s chief scientist, Ling Chen, who leads the Center for Industrial Development and Environmental Governance at Tsinghua University in Beijing, China. “We hope that the GIHI could help cities understand their potential and provide some direction for public policy to drive innovation.”

Led by Chen’s team at Tsinghua, and supported by Nature Research Intelligence, the 2023 GIHI examined the performances of 119 cities and



Ling Chen
GIHI’s chief scientist and director of the Center for Industrial Development and Environmental Governance, Tsinghua University.



▲ Huairou Science City is situated in Beijing, the third ranked global innovation hub in 2023.

metropolitan areas, which collectively are home to about 11% of the world’s population.

Similar to prior years, the analysis was based on three key indicators of innovation: research innovation, the innovation economy, and the innovation ecosystem. Each metric was constructed with a wide range of data.

For research innovation, these include the numbers of scientific researchers, top research universities and highly-cited research publications. The volume of patents generated, the number of ‘unicorn’ start-up companies and the financial performance of emerging industries were used to estimate the activity

of a hub’s innovation economy. Finally, the team analysed the availability of public services such as museums, libraries and even international flights to get a sense of the innovation ecosystem.

KEY FINDINGS

For the fourth consecutive year, San Francisco-San Jose has topped the ranking as the most innovative hub. This region houses many leading institutions and technology firms such as Stanford University and Apple. It also has access to a large, highly trained immigrant population in northern California and deep experience with intellectual property and venture investments, Chen says.

Other cities seeking to replicate its success could take concrete steps such as increasing the flow of venture capital or accelerating technology transfer from universities. But Chen believes that San Francisco-San Jose’s supportive and accommodating culture towards innovation will be difficult to replicate even for a top competitor like New York, which remained in second place for the GIHI 2023.

The rest of the top ten global innovation hubs (GIHs) were Beijing, London, Boston, Guangdong-Hong Kong-Macao Greater Bay Area, Tokyo, Baltimore-Washington, Paris, and Shanghai. Of the subsequent ten spots in the

ranking, the United States claimed six, with the remainder in Asia and Europe.

This year, the GIHI identified an intriguing connection between bay areas, such as San Francisco-San Jose or the Guangdong-Hong Kong-Macao Greater Bay Area, and hotbeds of innovation. “Bay areas have benefited directly from globalization,” says Chen. Typically located at the junctures of rivers and oceans, bay areas are where manufacturing, shipping, financial markets, and world populations meet. “The coming together of many industries and cultures in bay areas means it is easy to nurture creative new ideas,” Chen says.

WE CONTINUE TO BE ASTONISHED BY HOW QUICKLY THE CITIES IN ASIA ARE GAINING

While cities in the US and Western Europe still held a significant lead in scientific output, this year’s data showed that cities in Asia-Pacific are catching up — and fast. “Even though we expected this finding, we continue to be astonished by how quickly the cities in Asia are gaining,” Chen says.

In 2023, Beijing topped seven out of 22 areas of scientific study, second only to New York, which led in eight fields of study. Beijing also led in the number of supercomputers as a measure of vital infrastructure particularly for AI research, with almost double that of the next two GIHs, Guangdong-Hong Kong-Macao Greater Bay Area and San Francisco-San Jose.

With the rise of artificial intelligence (AI) services such as ChatGPT upending education, research, and content creation, emphasis was placed on AI as an area of

research in GIHI 2023. “AI has experienced explosive growth since 2020,” Chen says. Tokyo and San Francisco-San Jose dominated the generation of intellectual property underlying key foundational AI techniques, while Chinese cities were the key drivers for utilizing AI technologies.

BUCKING GLOBAL TRENDS

Persistent inflation and rising US federal interest rates in 2022 meant venture capital and private equity investments generally fell compared to 2021. But there were bright spots where economic activity remained robust in cities such as Singapore, Seoul, Dubai, and Hefei, Chen says.

Meanwhile, geopolitical tensions that created a push to bring advanced manufacturing — particularly of semiconductor chips — back to Western shores also produced an unexpected ‘Cinderella’ story: Phoenix, in Arizona, saw a 28-fold increase in foreign direct investment as the Taiwanese semiconductor giant TSMC began construction on its fabrication facility there. Their strong performance in this innovation ecosystem indicator catapulted Phoenix to the 26th place this year, from 41st in 2022.

Three other GIHs in the US broke into the top 20 this year: the Chicago-Naperville-Elgin in Illinois, Dallas-Fort Worth in Texas, and Chapel Hill-Durham-Raleigh in North Carolina. Of those, Dallas-Fort Worth scored especially well in the innovation economy indicators, ranking eighth among GIHs with high-value, high-technology start-ups. Chen believes that Dallas-Fort Worth has benefited from a post-COVID tech exodus from Silicon Valley thanks to its low taxes, low costs and friendly regulatory landscape.

The world in 2023 grappled with challenges



▲ This is the fourth year that the Global Innovation Hubs Index has been published.

such as the lingering effects of the COVID-19 pandemic, geopolitical tensions and new protectionist agendas over technological competition that threaten to stymie innovation. These trends may lead to many scientists facing restrictions, from participating in global collaborations or even travelling abroad, Chen says.

“But we can identify a few disciplines — whether in pure scientific research or in research contributing towards global public goods such as in climate change, renewable energy, and public health — where we can further dialogue, and continue to cooperate, and collaborate,” Chen adds, “since advancing research in these disciplines is for the global good.”

The GIHI team is also piloting city profiles as a

supplement offering for city governments that might want to know more about their performance. Chen says they are keeping an eye out for more sources of data that could serve as indicators of innovation and hot research fields to focus on, such as zero-carbon energy technologies, for next year’s analysis. ■

To read the full 2023 Global Innovation Hubs Index report, please visit: www.nature.com/collections/cideg2023



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