



THEIR VIEW

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India's innovation gap shows up in the financial data of our firms

Corporate India must recognize R&D as the foundation of long-term competitiveness before we can hope for breakthroughs



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Technological innovation in all quarters is critical for accelerated economic growth. However, India's research and development (R&D) debate often focuses on public spending; how much the government allocates, which missions are launched and what headline targets are announced. The data, however, suggests that India's innovation shortfall is fundamentally an industry story. What distinguishes India from global technology leaders is not an absence of policy intent, but the reluctance of corporates to invest meaningfully in research.

The recent *CTIER Handbook on Technology and Innovation in India 2025* brings out a few critical aspects of India's innovation landscape. First, India's R&D expenditure remains structurally low. In 2023, it stood at 0.6% of GDP, the lowest among major innovation economies, and has been stuck in a narrow 0.6-0.9% band for more than three decades. Over the same period, peer economies have steadily intensified their commitment by gradually scaling up R&D investments. Israel and South Korea consistently spend over 4% of GDP on R&D, the US exceeds 3.5% and China has raised its R&D intensity to around 2.6%, reflecting sustained policy and industry commitment to tech leadership.

Second, India's R&D ecosystem is heavily dependent on the government. In 2023, the public sector accounted for 55% of total R&D expenditure, while industry contributed just 36% and higher education 9%. This contrasts sharply with global patterns. Industry finances roughly 75-80% of R&D in the US and China, over 70% in South Korea and Germany, and close to 80% in Israel, underscoring the centrality of corporates in advanced innovation.

Third, recent trends are particularly concerning. Industry's share of India's R&D has fallen from 41% in 2018 to 36% in 2023, even as higher education's share rose modestly from 7% to 9%. India's industrial R&D expenditure in 2023 was under \$7.4 billion. As a stark contrast, Nvidia, which is ranked 26th among the world's top 2,500 R&D spenders, spends nearly as much as all of India's industry on R&D, while Alphabet, the top global R&D spender, spends almost five times that sum. Thus, at a time when corporate-driven R&D is driving frontier innovation globally, India's weakening industrial research effort signals a growing risk to long-term competitiveness.

The pattern of industrial R&D spending in India points to a strong concentration rather than broad-based technological diversification. Corporate research investment is largely confined to a limited set of sectors such as pharmaceuticals, automobiles, oil and gas, and software services. The first two of those together account for more than half our total industrial R&D expenditure, reflecting



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areas where firms benefit from established production strengths, regulatory familiarity and incremental innovation. By contrast, Indian industry invests relatively little in sectors that anchor global R&D activity, including electronic and electrical equipment, healthcare technologies, advanced manufacturing and industrial engineering.

This narrow focus has consequences. In 2023, as the handbook reports, 827 US and 679 Chinese corporates featured among the world's top 2,500 R&D spenders. India had just 22 corporates in that list. More telling is the sectoral balance. Strikingly, Indian corporates are missing from six of the ten most R&D-intensive global sectors, including electronic equipment and healthcare technology. Even where Indian corporates are present globally, such as in pharma, their R&D intensity remains below that of their international peers.

The behaviour of large Indian corporates further underscores this pattern. The top 100 R&D spenders account for nearly 78% of all industrial R&D in India, indicating a highly concentrated research landscape. Beyond a small group of conglomerates and established manufacturers, R&D spending drops off sharply. Many profitable Indian corporates with global revenues invest little in in-house research, relying instead on imported technology, licensing or incremental process improvements.

The handbook also highlights that India's innovation constraints are evident across the talent, research and intellectual property pipeline. In 2022, India had just 260 full-time researchers per million people, far below China's 1,849 and the US's 4,825, and trailing all comparable economies, with South Korea (9,435) and Taiwan (9,200) at the global frontier. While India performs better in doctoral output, producing 21,232 science and engineering PhDs in 2023, the third highest globally, this scale has not translated into high-impact

research. India ranked fifth globally in publications, contributing 714,016 papers (5% of global output) during 2019-23, yet records among the lowest citation impact scores across peers. Weak industry linkages compound this gap as only 1% of publications involve industry collaboration, compared with over 6% in Japan and Germany, while international collaboration remains modest at around 30%. Patent data shows some progress. Resident filings exceeded non-resident applications at the Indian Patent Office in 2023, reversing earlier trends, but the scale remains well below China's local innovation system.

India's innovation gap is visible in corporate balance sheets, sectoral choices, the global absence of our firms from frontier technologies and quality research. India generates a large number of start-ups, but relatively few are built on proprietary hardware, advanced materials or complex engineering capabilities. Recent initiatives such as the Anusandhan National Research Foundation, India AI Mission, and the \$12 billion Research, Development and Innovation fund reflect a recognition of this imbalance. Their success, however, will depend on whether they can reshape corporate behaviour rather than merely add incremental funding.

India's binding constraint is not capital availability, but risk appetite. Closing this R&D gap will require a decisive change in how Indian industry approaches research. Until R&D is recognized as the foundation of long-term competitiveness, this equilibrium is unlikely to shift. That, in turn, requires far deeper and more systematic collaboration between industry and academia to generate commercially relevant, patentable innovations. Unless R&D is internalized as the bedrock of long-term competitiveness rather than an optional adjunct to growth, this deficit will persist.

Is New York under Mamdani bent on overtaxing residents?

Expanded city services come at a cost voters may not understand



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France is great. I visit a few times a year, and the food is fantastic, the museums are amazing and day care is free (or heavily subsidized) for toddlers aged 3 months or more. New York City, where I live, is also great, with pretty good food and architecture. The day care, not so much.

Of course that French day care comes at a steep price. The French—even the middle class—pay much more in taxes. According to the OECD, the average single earner pays 28% of their income in taxes, compared to 24% in the US. And that does not include the large consumption taxes that Europeans pay.

Now New York's mayor wants the city to provide free child-care starting at six weeks, among other free services. He has also promised New Yorkers that someone else would pay for it: the rich. Last week, reality caught up with these plans. If Mayor Zohran Mamdani cannot get the tax increases he wants on high earners and corporations, all New Yorkers will need to pay—in the form of higher property taxes now and, later, a bailout of the pension and health-care funds he plans to raid.

There is a lot to criticize here. The tax on high earners is poorly structured and raises the rate to such a level that it may cause serious economic damage. New York City already spends a fortune on its residents and provides subpar services. With its existing obligations and variable tax revenue, increasing the budget another 9% is certainly imprudent, to put it mildly. And yet—even though I am a property owner in New York City, I wouldn't be subject to the millionaire tax and am kept up at night by underfunded pensions—part of me hopes this tax comes to pass. Voters elected someone who promised to expand the services the city offers. If they want that, we should all pay for it.

It is not just New York that is flirting with fiscal nihilism. Polls reveal US voters want two things: higher taxes on the wealthy and more entitlements. In other words, free stuff someone else pays for.

To a degree, this is understandable; this is the richest state in the world. America should provide people with a minimum standard of living. And wealthier people are better positioned to pay a higher tax, even if they already pay a very large share of taxes, and there is only so much more you can tax them. A large welfare state can be justified because it reflects how much we, as a society, value security over growth, the collective good over individual flourishing.

Personally, I would prefer a smaller gov-



New York's mayor wants the city to provide free child-care starting at six weeks. AP

ernment, but reasonable people can disagree. Striking the right balance, however, requires that the costs and benefits be widely understood and broadly felt. Europe made its choice, opting for higher taxes for all and a lower standard of living in exchange for more security.

My concern is that Americans do not internalize these trade-offs. I have always used three criteria when judging how good a tax is: efficiency (does not create distortions), progressivity (collects more from those who have more) and feasibility (relatively easy to collect). Now I am adding salience to my list: that is, whether people understand the taxes they are paying and what they get for them.

Franklin D. Roosevelt had the same idea when he created Social Security, which is why the programme is funded through payroll taxes on everyone. People would feel more connected, he reasoned, to a programme they paid into.

Today salience is the last thing any politician wants from a tax. Almost everyone (except maybe billionaire investor Warren Buffett and US politician Mitt Romney) already thinks they pay too much in taxes.

Directly increasing taxes on anyone who makes less than \$400,000 annually has become a political non-starter. Politicians have become addicted to promising more benefits—tax credits, health-care subsidies, now child care—that someone else pays for. Often the middle class ends up paying anyway. The cost of corporate taxes, for example, are largely borne by workers, but most people don't realize why their wages are lower.

As long as the taxes Americans pay are disconnected, there is no scope for fiscal discipline, let alone accountability for what we are already spending.

Odds are, people should be paying more. We all should—if we want our government to make good on its promises to pensioners, bondholders and the new and ever-growing population of beneficiaries.

New Yorkers are starting to have productive discussions about how much the city is already spending on schools, health benefits and all sorts of other things, and the impetus was the threat of higher property taxes in the city. Now imagine what the conversation would be like if we actually had to pay them.

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THEIR VIEW

The Russia-Ukraine war: Why peace is proving elusive

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On 24 February 2022, Russian forces crossed into Ukraine with the objective of demilitarizing the country and deterring Kyiv from joining the North Atlantic Treaty Organization. Russian strategic planners expected a Ukrainian collapse within a fortnight. Four years on, Moscow has yet to achieve its core wartime objectives of gaining complete control over the regions of Donetsk, Luhansk, Kherson and Zaporizhzhia. The conflict has already surpassed the length of the Soviet military campaign against Nazi Germany, making it Russia's longest in Europe in over a century.

Despite Russian forces controlling the tempo across multiple axes, they have struggled to achieve a breakthrough, as Ukrainian resistance has slowed their advance, with high losses on both sides. Meanwhile, efforts to find a negotiated settlement have gained momentum, with Russian, Ukrainian and American interlocutors meeting at various levels and formats. The recent trilateral talks

in Abu Dhabi have hinted at a more pragmatic approach, reflected in the participation of high-ranking political and military representatives from Russia and Ukraine, with deliberations on the implementation and modalities of monitoring a ceasefire. Yet, deep divergences in negotiating positions suggest that any peace without addressing these would be fragile.

State of the battlefield: Russia's military strategy seeks to exploit Ukraine's acute manpower shortage by deploying a swarm of troops across fronts in an attempt to spread the Ukrainian defence thin. As a result, Russian forces last year recaptured the Kursk region and opened a new front in Sumy, northeastern Ukraine. New gains were made in Donetsk with the capture of Pokrovsk, Myrnohrad and Siversk, as well as Huliapole in the Zaporizhzhia region. However, these gains are largely tactical rather than strategic, with Russia controlling only about one-fifth of Ukrainian territory. Domestically, Moscow faces mounting pressure from the high costs of financing the war, high interest rates, tightening sanctions and sustained Ukrainian strikes on energy infrastructure, all of which have resulted in the Russian economy overheating.

Despite severe manpower shortages, war

fatigue and reduced overt US support compared to the Joe Biden US presidency, Kyiv has constrained the Russian advance thanks to European partners scaling up military aid. It has intensified strikes on Russian energy and military infrastructure and developed a comparative advantage in limited-arms warfare, particularly through AI-enabled drones and precision-guided tools. Also, changes in key appointments, including the introduction of a popular wartime figure and Russia hawk Lieutenant General Kyrylo Budanov, as Zelensky's chief of staff, have renewed confidence in Ukraine's negotiating position. Budanov is said to be in close contact with his Western counterparts. Taken together, Ukraine remains far from capitulation despite incremental Russian advances.

Peace talks on shaky ground: Last February, negotiations resumed after the failure of early-2022 talks in Istanbul. They began in a bilateral US-Russia format, with Ukraine brought in later. By the end of 2025, after multiple

rounds of negotiations, a 28-point framework was outlined and later condensed to 20 points by the US and Ukraine (reducing clauses that ran counter to Ukraine's sovereignty). But Moscow rejected the plan. Core divergences include the warring countries' irreconcilable positions on territory, security guarantees and ceasefire terms.

Kyiv has vehemently opposed any attempt at salami-slicing its sovereign territory, calling for the restoration of its 1991 borders. But Russia is firm that a ceasefire will be contingent on Ukraine's withdrawal from Donetsk, Luhansk, Kherson and Zaporizhzhia. It also wants Crimea recognized as Russian territory. On security guarantees for Ukraine, it rejects the Western understanding of territorial integrity that affords Russia a false-saving exit, without enabling Kyiv to regroup and launch a counteroffensive. Any peace agreement that does not address these issues is likely to be fragile and vulnerable to fresh escalation.

The way ahead: What's increasingly evident is that neither the ritualistic expansion

of Western sanctions on Russia nor coercive pressure on Ukraine to accept a suboptimal settlement will in itself deliver sustainable peace. The limits of punitive maximalism and forced compromise are now stark. While the latest round of talks has stopped short of a breakthrough, it has kept the diplomatic channel ajar. The granular, technical negotiations that follow are likely to be more consequential.

These discussions could focus on areas where convergence, however modest, is possible: an exchange of prisoners of war, mutual restraint on targeting energy infrastructure, a halt to strikes on densely populated urban centres and the construction of structured pathways to address thorny questions of territory, security guarantees and the sequencing of a ceasefire. Such incrementalism may lack drama, but is often the precondition for strategic stabilization.

At its core, the dilemma is political as much as military. Crafting an arrangement that affords Moscow a face-saving exit, without eviscerating Kyiv's sovereign agency, is the central balancing act. Reconciling these competing imperatives—great power prestige and national self-determination—will determine whether diplomacy can move from managing conflict to resolving it.

The great-power prestige of one side must be balanced with the sovereignty of the other for its resolution

it and argues that a Russian withdrawal must not enable Kyiv to regroup and launch a counteroffensive. Any peace agreement that does not address these issues is likely to be fragile and vulnerable to fresh escalation.